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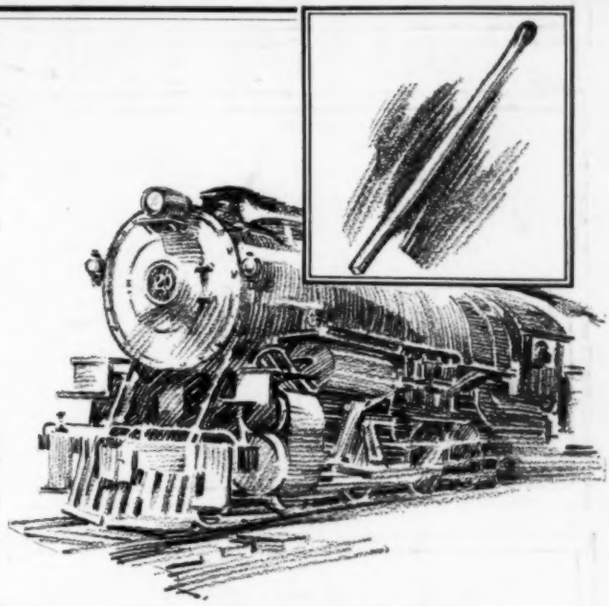

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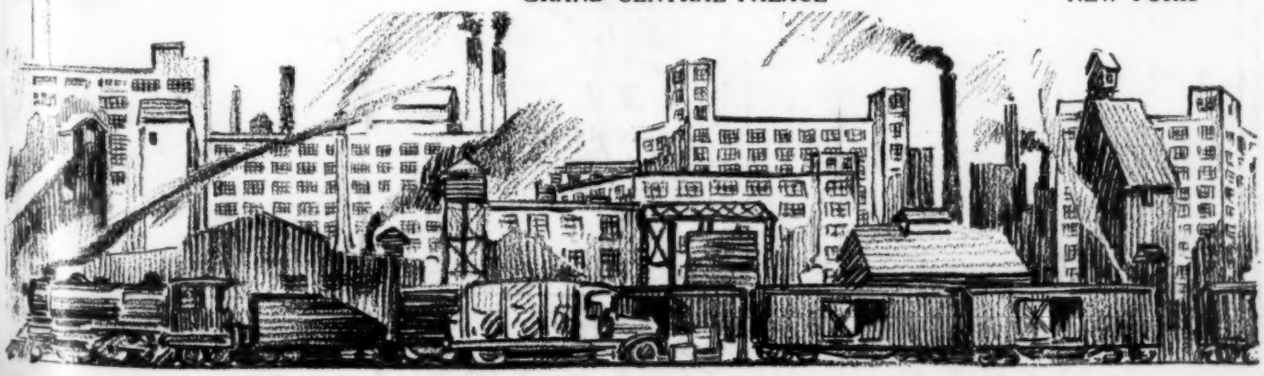

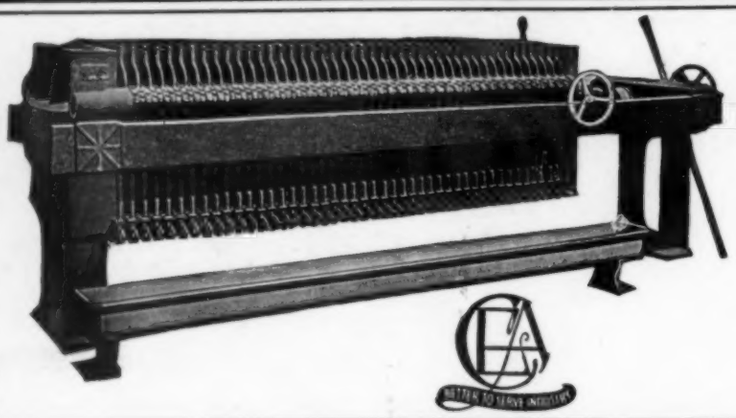

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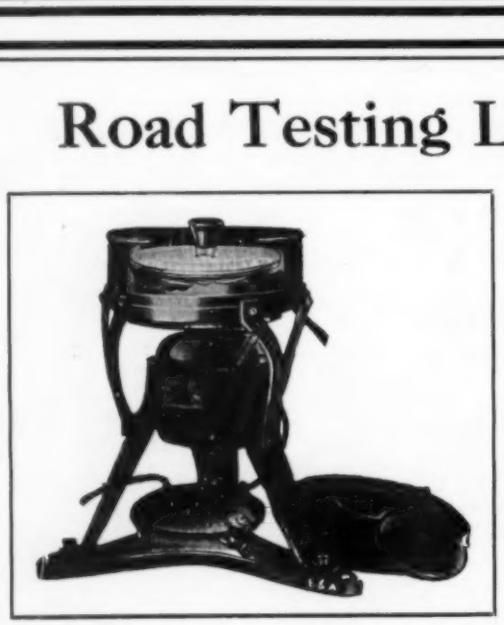

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CHEMICAL & METALLURGICAL ENGINEERING

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H. C. PARMELEE, Editor

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A Problem in Tariff Administration

RECENTLY a delegation from the United States Chamber of Commerce appeared before President Coolidge, making known to him the attitude of organized American business on several of the serious economic questions that the nation is now facing. One of these issues was the tariff, more specifically the administration of the flexible-tariff provisions of the act of 1922. While admitting that this legislation is a step in the right direction, it was made known that the chamber is distinctly in favor of a separate tariff adjustment board in order that the Tariff Commission can continue to function as a research and investigational body. This proposal was suggested as a solution for a problem which, while not generally recognized by the public, is nevertheless a matter of pressing importance.

The act of Sept. 8, 1916, creating the Tariff Commission, provided that its personnel should consist of six members, no more than three of whom should be appointed from a single political party. To be sure, the chairman and vice-chairman were selected from the party in power, but essentially the provision called for a balanced organization. And it is a matter of history that this arrangement proved most effective in carrying out the original purposes for which the Tariff Commission was established. These, it will be recalled, were purely investigational. The commission was charged with studying the economic and industrial effects of the tariff, collecting and presenting the data that would be of service to Congress in framing new tariff legislation. In such matters the Tariff Commission had no voice of its own; it could not recommend. Both sides were presented impartially and the action was up to Congress. Actually the work of the commission itself was largely to direct the investigations of its staff and to approve the impartial statements of facts thus ascertained.

The very creditable assistance which the Tariff Commission gave to the Congressional committees during the framing of the 1922 law was such that there was almost universal approval when President Harding designated the commission as the executive agency to assist him in administering the flexible-tariff provisions. Elaborate investigations had to be made, and certainly the experience of the commission admirably equipped it to carry out this important work. But these new responsibilities brought with them this essential difference in function: Once its investigation of a specific item had been completed, it was necessary for the commission to take a decisive stand and recommend a definite action to the Executive. Unfortunately tariff data, like economic and business conditions, cannot always be evaluated with the certainty of mathematical science. Differences of opinion and interpretation are bound to arise, and more often than not the division is between opposing political views. With the commission thus equally divided, deadlock results and progress is impossible. Perhaps this meets with the approval of those who oppose any attempt to change the present law, but obviously such inaction must eventually defeat the purposes of the flexible tariff.

The solution that first suggests itself would be to give the party in power the voting control of the commission. The minority could criticise, propose amendments and, if necessary, present its views in the form of dissenting reports. It could not, however, prevent the commission from taking a definite stand on any specific item or issue should such action be required. The principal argument against such an arrangement is that it might seriously endanger the commission's usefulness as an impartial investigational body. It is for Congress to decide, therefore, which of the two functions—administration or investigation—is the more important. If it is the decision that the permanent research work is no longer necessary, it might be possible to solve the administration problem by a simple change in form of organization. If, on the other hand, it is held that the commission should continue and expand along the lines of its original program, then the proposal for a separate tariff adjustment board is decidedly in order.

The Boll Weevil Takes Command

ACCORDING to reliable estimates the damage the boll weevil will cause this year to Southern planters alone, and not to other persons, is $750,000,000. It means the lack of about 6,000,000 bales of cotton. Therefore 48,000,000 steel ties which otherwise would have been booked as orders by the steel producers will remain unsold. There will be proportionately less cottonseed oil for the food and soap industries. Clothes will cost more, there will be less cotton stuffs produced and less new mill machinery will be required. Substantially all the people of the United States are tied together by cotton fibers, so far as their welfare is concerned. If the cotton-growing industry were removed from the United States, we should have such an attack of financial gripes up North as well as down South, out West as well as over East, that we should probably forget about prohibition, the farm bloc, anthracite coal, and whether we have bananas or not.

That little pest, the boll weevil, does not eat the leaves of the plant. It bores into the cotton boll, where it finds its nourishment, and there it deposits its eggs. The eggs are sealed up with a gummy covering, pro-

tecting them against the red ant, which otherwise would devour them. Sprays do not reach them in their colloidal envelope; indeed, nothing reaches them until a new crop of little worms hatches out to become next year's weevils. (Let us note in passing that the immunity of the eggs offers a real problem in colloid chemistry.)

When the war was raging and German submarines infested the deep waters there was no way known to tell where they were, or how to destroy them. It was a greater problem to locate them and to put them out of business than it is to conquer the boll weevil. But the submarine problem was solved finally, because it had to be done. We won out only after we had got a gait on in research. We did not lean back and twirl our thumbs in the pleasant hope that the regular staff of some government bureau would solve it by a lucky strike. The best minds of this and the allied countries were brought to bear upon the problem.

We haven't any such gait on in research to overcome the boll weevil. We're leaning back complacently with a view to letting Uncle Sam do it. We don't even realize how urgently we people up North and out West as well as down South need to have the problem solved. We may know, but we don't think how every live tropical and sub-tropical country is striving constantly to establish a cotton-growing industry, and thus to gather in the wealth that hitherto has come to us. When we do, we shall go to it and get results. But isn't it time to arouse public opinion to the fact that one of our greatest sources of national—and consequently individual—wealth is drifting away for lack of research?

The Present German Monopoly

REPORTS from government as well as other investigators who have recently returned from Europe have this point in common: No matter how black you paint the picture of Germany's financial plight, underneath this cloud you will find that the large German industries are essentially prosperous. The middle class and the wage earners are paying for the financial debauch that has accompanied the collapse of the mark. The large manufacturers, particularly those producing goods for export, have continued to expand their plants, pushing production to the very limit of raw material resources. But little of the money realized on their foreign sales, however, finds its way back into Germany. Instead it is invested or remains on deposit abroad.

Lately Christian Bahnsen, the head of a large textile organization in this country, has returned from one of his periodic visits to Germany and has added the weight of his testimony to the case against the German industrialists. He is reported by the New York *Evening Post* to have summarized his view in part as follows:

> A certain class of Germans are cheating their fellow citizens. Those who before the war invested their money in government bonds, real estate mortgages and domestic securities are impoverished, but the larger industrialists, the major chemical interests and the bankers and their affiliated commercial interests are very rich. In my opinion, based on a recent study of conditions in Germany and from information obtained at first hand, these interests possess billions put out at foreign deposit.

It is evident, to Mr. Bahnsen at least, that herein lies the solution of the reparation problem. Just as soon as the proper lever is found to pry these selfish profiteers away from their ill-gotten wealth, just so soon will Germany be able to pay her indemnity. The French apparently have already recognized this situation and it would now appear that the occupation of the Ruhr was really an attempt to reach the real culprits. Unfortunately it failed, just as every other means which has yet been tried has failed.

There is reason to believe that this object may some day be accomplished through the German workman and wage earner. Perhaps this will come peacefully with the establishment of a strong Berlin government that can enact and enforce the necessary taxation measures. Perhaps there will be a forceful disgorging with or without outside help. At any event it is becoming more and more apparent that we must look in this direction for the final settlement.

Phosphate Fertilizer— A Subject of National Significance

PHOSPHATE fertilizer has not only become a gigantic industry but a problem in national economics. Every mixed fertilizer has phosphoric acid as one of the principal components of its plant-food value. Phosphate fulfills an essential function in plant life. It hastens maturity; with the cereal crops it increases the proportion of grain to straw, at the same time improving quality. The annual production of acid phosphate is measured in terms of millions of tons. Certainly it is appropriate, therefore, that both as citizens and as men vitally concerned with production problems in the chemical engineering industries we should take phosphate fertilizer seriously.

What are the problems? Where are the raw materials? How are they obtained? What is the possibility of shortage or stoppage of raw materials? Is there waste in the utilization of the natural supply? These are questions discussed by Dr. W. H. Waggaman of the United States Bureau of Soils in an article published in this issue. The author's long experience with all phases of the phosphate problem lends to his interesting story an unquestionable authority. This article takes up the distribution, quality and mining of phosphate rock. Subsequent discussions will deal with methods of producing phosphate in a form available for plant food.

The Slipperiness Of Alcohol

ROY A. HAYNES, the U. S. prohibition commissioner, is having a grand time on the pages of our daily neighbor the *Times*. He has from a column and a half to two columns a day in which to tell of the battle royal he is fighting against the Powers of Evil and the Sin of Thirst. He makes some remarkable statements. For instance, he says that among 60,000 samples of whiskey tested, less than 1 per cent was found to be pure. We confess to such innocence in the matter that we do not even know what pure whiskey really is; whether a little prune juice, for instance, is an adulterant or not. In Ohio it seems that only one sample of bootleg liquor in 300 was genuine. And he notes the death of 100 persons in Chicago during 5 months of the current year from drinking poisonous compounds.

The *Times* is a great newspaper, and it is not easy

to get a couple of its columns of space, day in and day out, week in and week out and even month in and month out, in which to tell one's story. We sometimes sense the feeling that our brethren of the sanctum of that great journal get a little worried over the effulgence of the honorable commissioner's statements, but underlying them all we gather the fact that there are still a vast number of persons in this country who continue to consume alcoholic liquor. And no matter how spurious these liquors are, the fact remains that they all contain ethyl alcohol.

Now alcohol may not be bought legitimately at wholesale or retail for potable purposes. Unregenerate acquaintances tell us that there is no limit to the hardness of heart of the regular producers and dealers. They keep their skirts clean and abide by the law. But a new chemical art has been developed called "cleansing" which is practiced in secret and which consists in removing denaturants. We have even heard that there are no less than three different methods of removing every trace of benzene, for instance, from denatured alcohol, and these various "cleansings" seem to be accomplished with comparative ease. Then, with denaturants removed, it is also said that the production of gin is a simple matter. That seems to be the trouble.

Those Tables Of Physical Constants

LATELY we printed an article on diethyl sulphate in which the author explained how a great deal of hitherto current misinformation about the chemical, physical and physiological properties of the substance had retarded the use of this important and useful chemical. There is a great deal of chemistry and physics published that isn't so, but still much more than is not published at all. Unless we know what we are working with and studying, we do not get very far in research. It is only the old gentlemen with skull caps and long white beards who achieve lucky strikes in the laboratory, and they live principally in fiction, in the fiction of romance or the prospectuses of the fly-by-night promoters.

The first thing to know is the properties of the materials with which we are working. To determine them involves such long and arduous labor that few industrial research laboratories in this country can afford to undertake the task, for by the time one is ready to begin, the patience of the front office is likely to be exhausted. But if these properties were duly recorded and at hand, work could begin where it frequently must stop; and results would come along in far less time than is now required. The "Landolt-Börnstein-Roth Tabellen" are imperfect and incomplete. Eighty per cent of the information desired by the paper industry, for instance, is lacking. The edible oil and soap industry needs urgently thirty-four tables of data, and only eighteen, which are at once incomplete and unsatisfactory, are available.

We Americans, in international conference after the armistice, agreed to prepare these tables of constants or tables of properties as our part of the world's chemical work. The National Research Council has undertaken the task. A corps of men, with Dr. Edward W. Washburn as editor in chief, are now at work. Funds are needed to continue it, and they are lacking. It is up to the American chemical industries to support this undertaking that is needed so sorely.

The Chemical Exposition As an Educational Medium

FROM its inception 8 years ago the National Exposition of Chemical Industries has been regarded by the instructing staffs of chemical engineering departments as a most valuable adjunct. Their students have been encouraged to attend early and often. As time went on it has become more and more apparent that through lack of organized direction the student has not obtained benefit in proportion to the informational resources available.

Conferences involving educators, exhibitors and the exposition management led to the development of a student course on the fundamentals of chemical engineering and industrial chemical practice which will be a feature of this year's Chemical Exposition. In a measure this will take the place of the customary general addresses, which have been eliminated this year.

Beginning Tuesday, Sept. 18, at 9 o'clock, the morning will be devoted to lectures by prominent specialists in the various fields, while directed inspections of exhibits will take up the afternoons. Recitations and quizzes also find a place in the program and each student will be required to prepare a written report covering the course.

Admittedly the student has been a problem at previous expositions and this plan would seem to offer a solution that will be of benefit not only to the students but to the industry as well. Viewed from the latter angle, the movement is simply another instance of the spirit which has guided all of the shows—service to the chemical industries.

Exterminating Engineers

A MAGAZINE of large circulation lately published a page advertisement about exterminating engineers. Its purpose was not to drive out of business those of us who are wondering whether we had better take out a license or not. No. The word exterminating is used as an adjective, and not as a participle. It refers to a new kind of engineer who makes from $3,000 to $15,000 a year in his practice. "This new profession," says the advertisement, "offers its followers a position of dignity and independence, a free rein for initiative and those other recognized advantages enjoyed only by professional men." But those who enter these portals of learning will suffer "no poorly paid period of apprenticeship as is the case with doctors, lawyers and followers of the old-line professions." This, therefore, is a new-line profession. It takes 2 weeks to acquire it and presto! there is a young graduate with "a profitable business over night."

We thought when chauffeurs undertook to call themselves engineers that they were edging over to the professional side without adequate warrant. The advertisement, however, draws a line that we have missed. It places all of us that had to study and work to prepare ourselves as belonging to the old-line professions. The new-line pundits need only to send for a free booklet, then follow it up with a money order and get instructions, and there they are; professionally equipped.

Exterminating engineers aspire to be rat catchers and moth, bedbug and other vermin destroyers or exterminators. And the advertisement is right in so far as it says that there is plenty of business for them—if they can get it.

Rubber Latex—An Industrial Drama

The Story of a Development That May Lead to a Commercial Revolution in the Rubber Industry

HAVE you ever seen any rubber latex? Probably not, for it is by no means a familiar article of commerce at the present time. Yet month after month it is becoming more familiar in this part of the world. There is a reason for this, and the reason is Ernest Hopkinson of the United States Rubber Co.

MR. HOPKINSON brought out of a cabinet in his office a mason jar filled with what might easily have been milk. "This has been standing for some little time and it has creamed very much as milk would," he said as he removed the top of the jar. He then dipped his finger into the liquid and a layer of creamy material stuck to it. "This will coagulate quickly if rubbed," he continued, "as the friction of rubbing, the acids from the skin and the evaporation of the water, all assist in the coagulation." He rubbed his finger in the palm of the other hand for a few minutes and quite suddenly he had a small ball of white characteristic rubber. "Most of the latex is a good deal thinner than that cream," he added, stirring up the liquid in the jar until it was homogeneous, when it had the consistency of thin milk.

"LATEX is, as you know, a colloidal solution of rubber particles in water together with small quantities of resins and sugar. As it is drawn from the Hevea tree it will vary from 20 to 40 per cent rubber. With such a material it might be assumed that one of the big problems would be the prevention of coagulation. However, DeVries long ago discovered that both ammonia and formaldehyde served as an adequate protection against coagulation.

"THE first real problem of a research nature was the production of rubber from the latex. Of course it would have been easy to obtain the plantation rubber by using acid precipitation, but this rubber is not as high grade a product as the old para rubber cured over the smoky flame of the Brazilian nuts. Our aim was a better rubber, and this has been achieved by our organization through the spray drying of latex. This process is now carried out on a large scale in our New Jersey plant.

"SPRAY-DRIED rubber is a peculiar product," went on Mr. Hopkinson, exhibiting a piece of spongy material almost white in color. "This material can be pressed in a hydraulic press and the product milled and compounded like plantation rubber. But the greatest commercial advantage of rubber latex is that milling is no longer essential. All of the compounding and vulcanizing materials can be incorporated by mixing into the latex and then the mixture can be spray-dried. This dried material can then be molded and vulcanized at much lower temperatures.

"IN THE preparation of tire fabrics the use of latex gives a much more perfect impregnation of the fabric with rubber than is possible with a solution of rubber in an organic solvent. Additional layers of rubber can be put on as usual with a roll and the whole is then vulcanized."

The Raw Materials for Phosphate Fertilizer

What Are the Sources of Phosphate? Where Are There Supplies of Phosphate Rock? How Extensive Are They? What Are Their Characteristics?

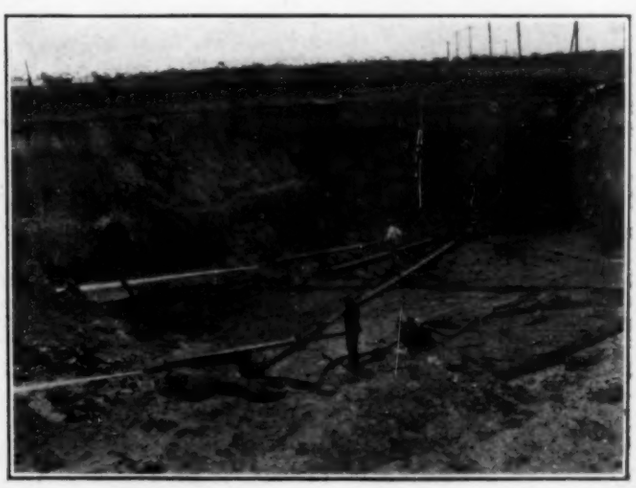
By William H. Waggaman and Henry W. Easterwood
Bureau of Soils, Washington, D. C.

THE use of fertilizer materials carrying phosphoric acid antedates by a great many years the knowledge of their composition. Bones, fish and guano were favorite fertilizers among the ancients, but the origin of their use is lost in antiquity. These phosphate carriers also contain certain amounts of organic nitrogen, but their agricultural value is largely due to their high phosphoric acid content. While these three fertilizer materials for a long time were the world's chief sources of phosphoric acid, their nature and composition were not discovered until about the middle of the eighteenth century when Gahn found phosphorus to be an essential constituent of the bones of men and animals. (See Thorpe's Dictionary of Applied Chemistry, Vol. III, p. 182; and Watt's Dictionary of Chemistry, Vol. IV, p. 500.) At the beginning of the nineteenth century the consumption of bones was so great in England that the old battlefields of the continent were turned up to supply the demand and there was subsequently a great deal of bitter feeling among other nations because it was thought that England was draining Europe of its main phosphate resources.

For many years the guano deposits of Peru were a favorite source of fertilizer material, most of the product being shipped to Europe, but an appreciable tonnage coming to this country. Until regulations were passed, however, forbidding the indiscriminate exploitation of the Guano Islands, it appeared that these deposits would also soon be exhausted, for the sea fowl to which this material largely owes its origin were being driven away to other breeding grounds. (See "Peruvian Guano Deposits," *Amer. Fertilizer*, 1914, vol. 40, No. 6, p. 56; "Peruvian Guano Production," *Amer. Fert.*, 1914, vol. 41, No. 7, p. 47; "Peruvian Guano," *Amer. Fert.*, 1914, vol. 45, No. 7, p. 25.) By limiting the time when guano could be removed from certain islands and allowing this material to accumulate on others, this source of phosphatic fertilizer, although relatively small, is still being maintained.

While bones and bone products, fish and fish scrap may be considered practically inexhaustible sources of phosphatic fertilizer in so far as the replenishment of the supply is concerned, the tonnage available at any one time is entirely inadequate to meet the present fertilizer demands, so had no other resources of this fertilizer ingredient been developed there would be little prospect of expanding the fertilizer industry.

The value and use of what are now our main sources of phosphoric acid are relatively recent discoveries. The low-grade phosphates of England and France were discovered between 1845 and 1852, but had it not been for Liebig, apatite and phosphate rock would probably have been long regarded as of little or no value from a fertilizer standpoint. (See Fritsch, "Manufacture of Chemical Manures," 1911, pp. 14 and 26, and "Organic Chemistry in Its Application to Agriculture and Physiology," 1840, p. 184.) Liebig's proposal to treat bones and phosphate rock with sulphuric acid in order to convert P_2O_5 into a water-soluble form was



TWO METHODS OF MINING PHOSPHATE

At left—Mining South Carolina phosphate by hand labor. This photograph was taken several years before the outbreak of the World War. It is needless to say that such practice is no longer economical. At right—Mining Florida pebble phosphate by hydraulic means. Immense tonnages of Florida phosphate are mined, washed, dried and shipped without being touched by hand. (Picture is furnished through the courtesy of the Coronet Phosphate Co.)

eagerly taken up by the more civilized countries and marked the beginning of the immense acid phosphate industry which is the basis of the fertilizer business in this country and a dominant factor in that of many other nations. Only the production of basic slag, a byproduct of the steel industry, approaches the annual output of this material. The manufacture of basic slag will be discussed in a subsequent article.

Natural Deposits of Phosphate of Lime. The natural deposits of phosphate of lime are now the main source of phosphoric acid for fertilizer purposes and since 1869, when phosphorites were first exploited in South Carolina, the United States has been the leader in the production of this mineral and is now the greatest consumer of phosphatic fertilizers.

Few minerals marketed today are found at a greater number of geologic horizons, occur under a wider range of natural conditions and are mined by such a variety of methods as phosphate rock. It is found in both igneous and sedimentary rocks, in deposits of Ordovician, Silurian, Devonian and Carboniferous Age, in Jurassic, Cretaceous and Tertiary strata, and in even more recent deposits. It occurs in almost every form, from veins of hard crystalline apatite to soft clay-like material resembling kaolin, and from black, massive rock occurring in thick seams which have been mistaken for coal, to brown, porous, thin-bedded strata or to small white nodules or pebbles. We have deposits that show little evidence of organic origin and others that are largely made up of fossilized bone, teeth and the water-worn casts of phosphatic shells, but in no country are there more varieties of phosphate, as wide a range in their manner of occurrence and more up-to-date mining methods practiced, yet at the same time greater losses of this valuable mineral than in the United States.

The annual production of phosphate fertilizers is measured in millions of tons. Thus the supply of this material is a problem in national and international economics. This article, the first of several dealing with the significant problems of phosphate fertilizer, presents a comprehensive and reliable survey of the source of supply.

It is not within the scope of the present article to describe in great detail the various phosphate areas of this country, but a brief outline of the more important deposits and of the general methods of mining and marketing the product is essential to a clear understanding of the present status of phosphate manufacture, and necessary in order to visualize the future of this expanding industry.

Florida Phosphates. While there are three broad types of phosphate being mined and marketed in the Florida fields, only the hard rock phosphate and the land pebble variety are of any great commercial importance today.

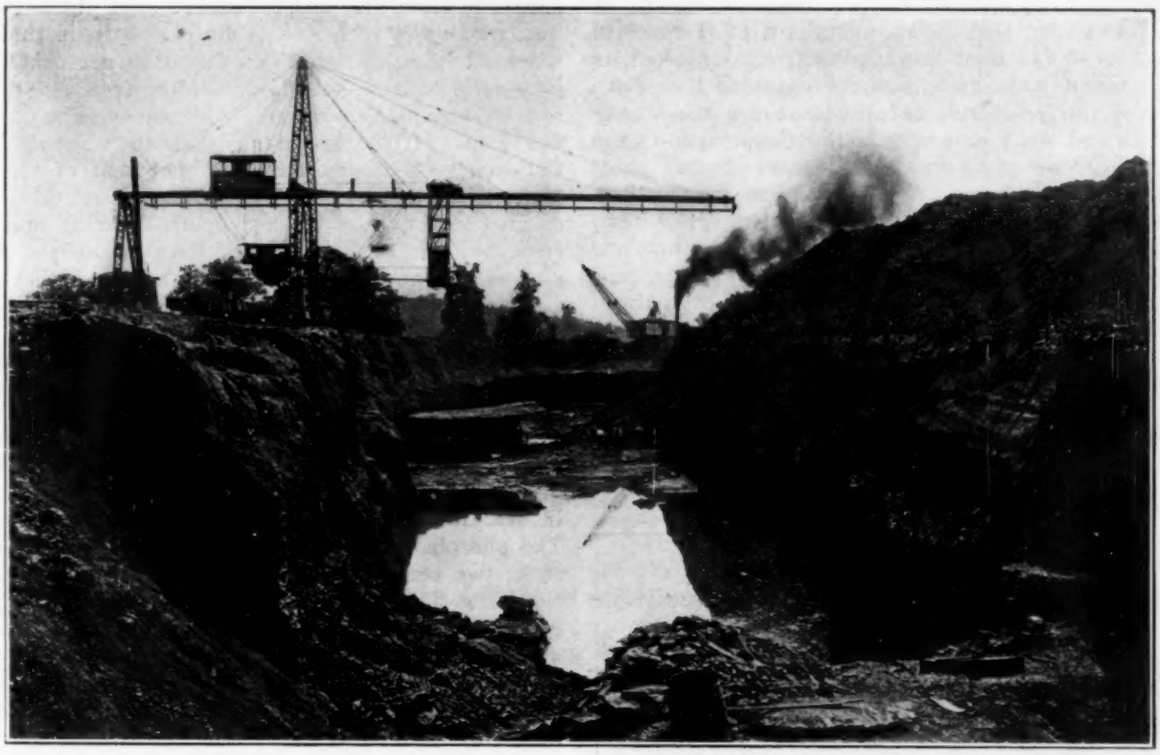
The hard rock phosphate area lies along the west coast of the Florida peninsula, extending in a general north and south direction from Columbia and Suwanee counties to Citrus and Hernando, a distance of approximately 100 miles. This phosphate, which was the first type to be discovered in Florida, is of Tertiary Age, and as a whole consists of boulders and nodules of a hard cream-colored rock imbedded in a matrix of sand, clay and soft phosphate. Although the hard rock phosphate is of an exceptionally high grade, the deposits are of a pockety nature and so irregular in their occurrence that it requires careful and costly prospecting to determine accurately their value and extent. All phosphate mining in Florida is conducted in open pits, since the rock is overlain as a rule by strata of sand and clay varying from a few inches to 30 ft. or more in thickness.

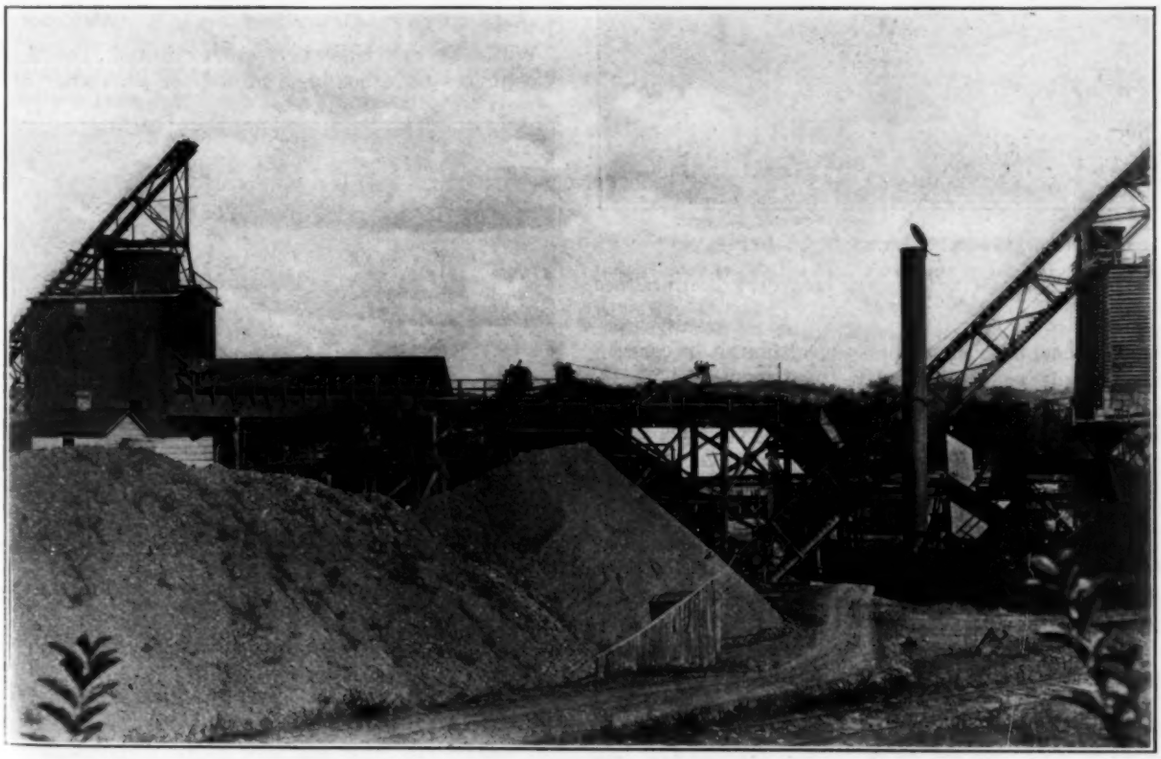
After the overburden has been removed from a deposit, the phosphate and matrix are dug or dredged out and hauled to the washer plant, where it is put through a combined washing and screening process. As a rule, all particles finer than ¼ in. are discarded along with the impurities and pass to the dump or waste pond. It is exceptional if 15 per cent of total material sent to the washer is finally recovered as marketable rock, and even where a recovery as high as this is obtained, the actual amount of phosphoric acid in the 85 per cent of fines which goes upon the waste heap is greater than that marketed in the form of high-grade phosphate rock.

The pebble phosphates of Florida are the most extensively worked of any in the world. The phosphate area includes the eastern part of Hillsboro, the southwestern part of Polk and the northwestern portion of De Soto County, the chief mines being in Polk and Hillsboro counties, from 20 to 40 miles east of Tampa, to which port the bulk of the phosphate is shipped. These deposits are also of the Tertiary Age, but belong to a somewhat more recent formation than that of the hard rock phosphate. The deposits are more regular in their occurrence and the recovery of phosphate in the washing process (similar to that employed in hard rock regions) is on the average considerably higher.

Hydraulic mining is almost universally employed in these fields and immense tonnages are thus readily and cheaply handled. While the losses entailed in preparing pebble phosphate for the market are not as serious as in the hard rock regions, nevertheless they are very high and in most instances the tonnage of phosphoric acid that goes upon the dump is fully as great as that sold in the form of marketable rock. These fields have had an average annual production of 2,000,000 tons of phosphate rock for the past 15 years and the equivalent of this amount has been discarded along with the impurities in the deposits. While many of these waste heaps are readily accessible, it is doubtful if it will ever pay to rehandle this material. However, the development of new processes whereby a more complete recovery of the phosphate content of the pebble deposits could be effected, if applied to future mining operations, would prolong greatly the life of these exceptional fields.

Tennessee Phosphates. In Tennessee there are three distinct types of phosphate rock, two of which vary so greatly in their mode of occurrence and physical properties from the Florida phosphates that their nature and value were long unsuspected. Only the white phosphate of Perry and Decatur counties (which was the last type discovered in this state) bears any resemblance to that of Florida. This type, however, occurs in nodular or boulder form imbedded in a matrix of sand and clay, somewhat similar to the hard rock





Mining Tennessee Phosphate

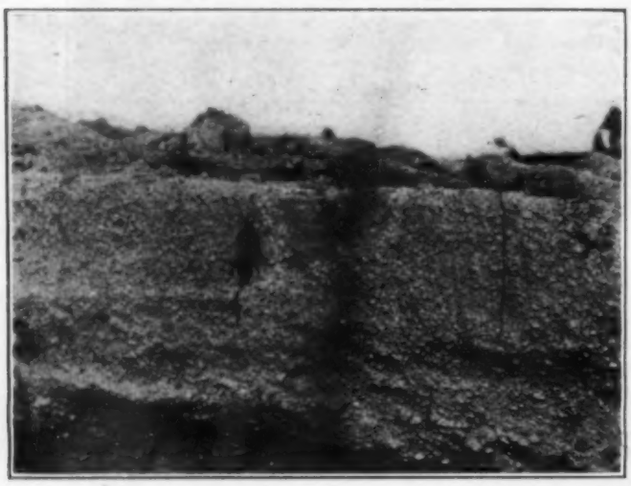
Above—Brown rock phosphate mining near Mt. Pleasant, Tennessee

Below—A washing and drying plant for handling brown rock phosphate

(Pictures furnished through courtesy of Hoover & Mason.)

phosphate found along the west coast of the Florida Peninsula.

The brown or Ordovician phosphate of Tennessee, which has so far been the most actively exploited, is found over a wide area, but the deposits that have proved of the greatest economic value are those near Columbia and Mt. Pleasant in Maury County and in the vicinity of Wales Station, Giles County. Brown phosphate is a residual deposit resulting from the weathering of highly phosphatic limestone, and the beds rest, as a rule, upon the parent rock from which they are derived. This type of phosphate occurs in strata consisting either of brown, porous plate rock or disintegrated rock which has become so mixed with impurities that a washing process is necessary in order to obtain a marketable product. But in spite of the most up-to-date mining and washing equipment large losses of Tennessee phosphate are unavoidable as long as mechanical means alone is depended upon to separate this mineral from its impurities.



A BED OF FLORIDA PEBBLE PHOSPHATE

The keys give an idea of the size of the individual pebbles that are imbedded in a matrix of sand and clay. (Picture furnished through courtesy of Coronet Phosphate Co.)

The blue phosphate of Tennessee, although in certain localities closely associated with the brown phosphate, belongs to a different geological period (Devonian) and is entirely distinct in its physical properties. The blue phosphate is a hard, massive rock, varying in color from blue-black to a medium gray. It occurs in definite strata, and is mined similarly to a seam of coal, the workings usually being under ground. The rock requires as a rule no washing, since it is obtained in marketable form unmixed with foreign material. The nature and mode of occurrence of the blue phosphate are such that the losses entailed in preparing it for the market are not anything like as serious as those resulting in the mining of the brown phosphate; nevertheless, where lower grade strata occur in close proximity to the high-grade rock, the former are frequently discarded and subsequently irretrievably lost when the tunnels or drifts are finally abandoned.

South Carolina Phosphates. The phosphate deposits of South Carolina occur along the coast in a belt 20 miles in width, extending from the Wando River in Charleston County to the Broad River in Beaufort County. The phosphate belongs to the Tertiary period but geologists differ regarding its exact age. The phosphate occurs in the form of nodules and boulders in a matrix of sand, clay and calcareous mud, the beds varying from a few inches to as much as 3 ft. in thickness. These nodules average from 30 to 50 per cent of the phosphate stratum—the beds yielding from 300 to 1,500 tons of phosphate per acre, with an average of about 850 tons. It is estimated that in washing South Carolina rock approximately 20 per cent of the phosphate is discharged along with the clay and other finely divided impurities. Washed South Carolina phosphate contains from 60 to 61 per cent bone phosphate of lime and was at one time considered the finest rock available, but with the discovery of the higher grade and more cheaply mined phosphates of Florida and Tennessee the production of South Carolina rock gradually fell off until in 1921 mining operations ceased entirely.

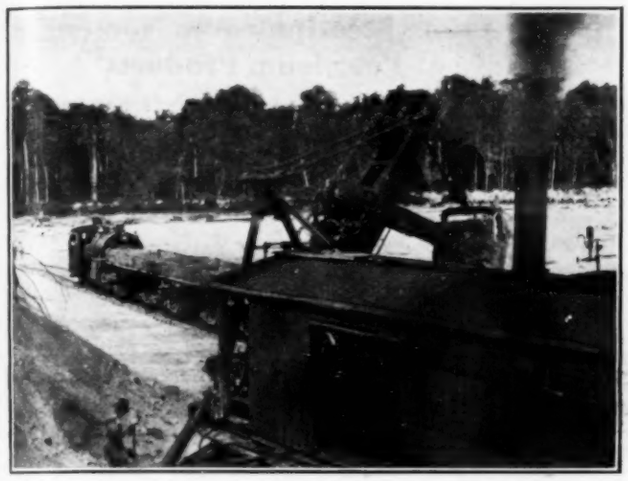
Arkansas Phosphates. The Arkansas phosphate deposits, which are located in the northern-central part of the state, belong to the Ordovician period and occur in definite strata underlain and overlain by limestone. The phosphate as a whole is a massive grayish-brown rock; two definite strata being recognized, one directly overlying the other. The upper stratum is the higher grade and the only one considered sufficiently rich to warrant its use in the manufacture of acid phosphate. The average grade of this upper bed is 55 per cent bone phosphate of lime, while the lower grade material runs only from 30 to 40 per cent. In mining operations much of the latter material has been thrown aside and lost beyond recovery in some of the old abandoned tunnels.

While at one time actively exploited, the Arkansas phosphates have not been mined for a number of years.

PHOTOGRAPH TAKEN INSIDE TUNNEL IN THE WESTERN PHOSPHATE FIELDS

A great phosphate vein of unknown thickness. (Picture furnished through courtesy of Anaconda Copper Co.)

Western Phosphates. The phosphates of the Western states Utah, Idaho, Wyoming and Montana are of Carboniferous Age and are quite distinct from those in the East in their physical appearance. The phosphate as a whole consists of a gray to black oölitic rock occurring in bedded deposits interstratified with phosphatic limestones and phosphate-bearing shales. The phosphate occurs in a very rugged region, and the beds in many cases are much tilted but quite accessible in some of the canyons. A number of strata, varying from a few inches to 6 ft. or more in thickness, will average 72 per cent B.P.L. or more. Western phos-



A STUDY IN CONTRASTS

At left—Mining phosphate by steam shovel in the semi-tropical regions of Florida. (Picture furnished through courtesy of Coronet Phosphate Co.) At right—A phosphate mine in the mountains of Idaho, where the temperature often drops far below zero and heavy snows impede transportation. (Picture furnished through courtesy of Anaconda Copper Co.)

phates, however, have been exploited to only a very limited extent due to their distance from fertilizer markets. The most promising means of utilizing these phosphates at present appears to be to manufacture it into high-grade acid phosphate by treating the rock with the sulphuric acid obtained as a byproduct at one of the large smelters in Montana. The immense beds of phosphatic shales occurring above and below the higher grade phosphate strata often contain 40 per cent B.P.L., but none of this material has a market at present, and in mining the better grades of phosphate these shales are thrown aside and in many cases large tonnages have been lost beyond any possibility of recovery. Unless a more economical method of recovering the phosphoric acid in these shales is devised, they will represent in the future a tremendous waste of phosphoric acid which will eventually be needed for agricultural purposes.

Available Supply of Phosphate Rock. Any estimate of the reserve supply of high-grade phosphate rock in the United States must be at best only an approximation, because, as pointed out in a previous part of this article, the limits and extent of many of the phosphate deposits can be determined only by careful and detailed prospecting. In the two accompanying tables, however, one compiled by the senior author in 1913 and the other by W. C. Phalen in 1915, estimates of the amount of phosphate rock available in the various fields of this country are given. (See "Reserve Supply of Phosphate Rock in the United States," *J. Ind. Eng. Chem.*, 1914, vol. 6, p. 464, and "Phosphate Rock in 1915," Mineral Resources, U. S. Geological Survey, 1916, Part II, pp. 227-244). Several million tons of phosphate have been mined since these estimates were made and

TABLE I—RESERVE SUPPLIES OF HIGH-GRADE AND LOW-GRADE PHOSPHATES IN THE UNITED STATES

	Tons
Utah, Idaho, Wyoming and Montana:	
High-grade	2,500,000,565
High-grade equivalent of all grades	7,500,000,000
Florida:	
High-grade equivalent of all grades	336,841,936
High-grade equivalent of wash heaps	20,000,000
Tennessee:	
High-grade equivalent of all grades	111,108,302
South Carolina:	
High-grade equivalent of all grades	9,471,752
Arkansas:	
High-grade equivalent of all grades	20,000,000
Kentucky:	
High-grade equivalent of all grades	500,000
	10,497,912,555

TABLE II—ESTIMATED QUANTITY OF PHOSPHATE ROCK AVAILABLE IN THE UNITED STATES. (U. S. GEOLOGICAL SURVEY).

Eastern States:	Long Tons
Florida	214,584,714
Tennessee	85,357,825
South Carolina	8,771,464
Kentucky	1,000,000
Arkansas	20,000,000
Total	329,714,003
Western States:	
Utah, Idaho, Wyoming and Montana	5,367,082,000
Grand total	5,696,796,003

TABLE III—PHOSPHORIC ACID CONTENT OF RUN-OF-MINE, LOW-GRADE AND VARIOUS WASTE PHOSPHATES WHICH CANNOT BE USED IN MANUFACTURE OF ACID PHOSPHATE

Materials	Location	Thickness of Bed or Stratum, Ft.	Description	Analyses P_2O_5 Per Cent	Analyses $Ca_3(PO_4)_2$ Per Cent
Run of mine (hard rock)	Newberry, Fla.	Not det.	Cream-colored material containing clay and lump rock	30.69	67.00
Waste from washer	Newberry, Fla.	Not det.	Sand, clay and soft phosphate	12.14	26.59
Waste from washer	Anthony, Fla.	Not det.	Sand, clay, finely divided phosphate	12.70	28.21
Material from picking belt	Dunnellon, Fla.		Clay balls containing phosphate, lime, rock, etc.	11.60	25.40
Run of mine (pebble)	Mulberry, Fla.	20	Pebble phosphate, sand, clay and soft phosphate	21.52	47.02
Waste from washer	Mulberry, Fla.	Not det.	Sand and finely divided phosphate	14.57	31.83
Run of mine	Bartow, Fla.	Not det.	White, soft claylike	23.61	51.59
Run of mine	Ridley, Tenn.	6 to 10	Brown plates, finely divided phosphate, clay, and sand	25.84	56.70
Run of mine	Mt. Pleasant, Tenn.	5 to 7	Brown plates, finely divided phosphate, clay, and sand	26.44	58.00
Waste from washer	Mt. Pleasant, Tenn.	10 to 15	Finely divided phosphate, sand and clay	14.21	31.20
Run of mine (best grade)	Wales, Tenn.	10 to 20	Brown disintegrated phosphate, sand and clay	23.85	52.25
Run of mine (medium grade)	Wales, Tenn.	10 to 20	Brown disintegrated phosphate, sand and clay	20.00	43.80
Run of mine (low grade)	Wales, Tenn.	10 to 20	Brown disintegrated phosphate, sand and clay	11.23	24.60
Phosphate shale	Georgetown, Idaho	42	Brown calcareous phosphatic shales	23.6	51.60
Bedded phosphate	Near Batesville, Ark.	6	Hard, grayish brown oolitic	24.8	54.20
Bedded phosphate	Near Batesville, Ark.	2	Hard, grayish brown oolitic	14.2	31.00
Run of mine	Woodford Co., Ky.	6½	Thin bedded phosphate mixed with sand and clay	22.85	50.00
Run of mine	Jessamine Co., Ky.	8½	Soft, dark brown easily disintegrated	23.70	51.80

therefore the tables are brought up to date by deducting the amount produced during this 8- to 10-year period. (No deduction is made for the Western phosphates, since the tonnage mined in this period is negligible.)

Since the annual output of high-grade phosphate rock from our Eastern deposits is normally about 3,000,000 tons, these more accessible fields may be exhausted within a hundred years even should there be no greater consumption than at present. But if our agricultural production is to continue its steady healthy growth, we must expect a far greater demand for phosphatic fertilizers than now exists. Under the present system of mining and preparing phosphates for the market it is not inconceivable that many deposits will be exhausted within the next 50 years, for the demand for high-grade rock carrying from 68 to 75 per cent or more of bone phosphate of lime is such that lower grade material receives little consideration.

The figures given in Table I show that the bulk of our phosphate material is of relatively low grade, much of which is being or will be wasted because of its close association with the higher grade rock and the apparent necessity of discarding finely divided phosphate in the mechanical separation of such impurities as clay and sand.

In Table III is given the phosphate content of run-of-mine phosphates from various sources, the composition of the lower grade strata so intimately associated with higher grade phosphate rock, and the waste material which is discharged in preparing a high-grade marketable product.

It seems evident that unless methods are devised and adopted whereby a fuller utilization of our phosphate resources are effected, the exhaustion of our Eastern reserves is a matter of only a century at best. While the deposits of high-grade rock in the West might continue to supply our needs for several more centuries, there would be an increase in the cost of this fertilizer ingredient due to the long haul.

Fortunately there is evidence that new processes are being developed whereby lower grade materials can be successfully employed as well as high-grade phosphates in producing soluble or available phosphoric acid. The advances which have been made along these lines will be discussed in subsequent articles.

How to Make Lime Set Quickly

Some months ago the Bureau of Standards developed a quick-setting lime composed of 1 volume of ground quicklime and 2 volumes of hydrate. The commercial success of this material depends upon finding some way to make it keep during shipment, or else to make it into finished form at the factory. Working on this latter phase of the subject, the bureau has been developing a cast lime partition tile. Experiments have shown the best composition to be 1 volume of wood fiber, 5 of quicklime and 10 of hydrate; and that the best curing condition is outdoors exposed to the weather. Such a block sets so that it can be removed from the mold in 10 minutes, can be handled in 20 minutes, can be sawed and nailed and has a compressive strength of 100 lb. per square inch at 7 days. It is about 20 per cent heavier than gypsum tile of the same size, and experiments are now being conducted to see if the core volume can be increased without too great a sacrifice of strength.

Special Committee Improves Nomenclature of Petroleum Products

The nomenclature of petroleum products has recently received considerable attention at the hands of a joint committee of the A.S.T.M. and the American Petroleum Institute. This committee has been called the joint committee for the nomenclature of petroleum and its products, and was made up of K. G. Mackenzie, chairman; Van. H. Manning, ex-officio; T. G. Delbridge, W. E. Perdew, R. R. Matthews, S. E. Campbell, and F. W. Lane.

A report has already been prepared covering definitions for the terms "crude petroleum," "weathered crude," "benzine," "petroleum naphtha," "gasoline" and "petroleum spirits." These definitions follow:

Crude Petroleum (Crude Oil, Petroleum, Crude)—A naturally occurring mixture, consisting predominantly of hydrocarbons, which is removed from the earth in liquid state or is capable of being so removed.

Note—Crude petroleum is commonly accompanied by varying quantities of extraneous substances such as water, inorganic matter and gas. The removal of such extraneous substances alone does not change the status of the mixture as crude petroleum. If the removal of such extraneous substances also results in the removal of more than a trace of the naturally occurring mixture, the resulting product is no longer crude petroleum.

Weathered Crude—A crude petroleum from which a perceptible quantity of the more volatile constituents has evaporated.

Benzine—This term is archaic and misleading and should not be used.

Petroleum Naphtha—A generic term applied to refined or unrefined petroleum products and liquid products of natural gas, at least 95 per cent of which distill below 500 deg. F. when distilled in accordance with the tentative method of test for distillation of gasoline, naphtha, kerosene and similar petroleum products (serial designations: D 86–23 T) of the American Society for Testing Materials.

Gasoline—A refined petroleum naphtha which by its composition is suited as a carburant for internal combustion engines.

Petroleum Spirits—A refined petroleum naphtha, with a minimum flash point of 70 deg. F. (tag closed tester A.S.T.M. standard) with a volatility and other properties making it suitable as a thinner and solvent in paints, varnishes and similar products.

Note—The use of the term "turpentine substitute" is to be condemned as false and misleading. The term "mineral spirits" also should not be used, as it includes within its scope not only petroleum products but other hydrocarbon mixtures, such as coal-tar distillates.

Rare Uranium Minerals Identified

Alfred Schoep, of the University of Ghent, who has been engaged in an investigation of the uranium minerals found in the Belgian Congo, just has announced his identification of several new uranium minerals, to which he has assigned formulas as follows: Curite, $PbO.5UO_3.4H_2O$; Kasolite, $3PbO.3UO_3.3SiO_2.4H_2O$; Dewindtite, $PbO.2UO_3.P_2O_5.3H_2O$; Soddite, $5UO_3.2SiO_2.6H_2O$; Becquerelite, $UO_3.xH_2O$.

A uranotitanocolumbate of calcium containing small amounts of rare earth has been designated as Mendeleeffite. The chemical formula has not been established definitely but it is approximately U_3O_8 23.5 per cent, and CaO 15 per cent. It is considered as a variety of Betafite but contains no water of crystallization.

Densities of Important Industrial Gases—A Review

By Marion Smith Blanchard
Assistant Chemist, Bureau of Standards, Washington, D. C.

IN CONNECTION with the preparation of a forthcoming circular of the Bureau of Standards which will describe the relations between the densities, pressures and temperatures of the more common gases, this review of the more important determinations of the weight of a normal liter of each of the gases considered has been prepared. An attempt is made to choose the most reliable value for each. The number of sources of the gas in question, the methods used for its purification, the precautions observed in making the experimental measurements, the number of observations made, the agreement between observations of a set and the concordance between the results of the different observers have all been carefully considered in the selection of a final value. While some attention has been given to the best of the early determinations, as indicating the development of the subject, in general only those which should be considered in selecting the final value have been mentioned. The excellent review which Guye published in 1907 has been of great value in the work. (See *J. chim. phys.*, vol. 5, p. 205; *J. Am. Chem. Soc.*, vol. 30, p. 145.)

Practically every chemical engineering industry makes use of gas in one form or another. Accurate process control, the design of new apparatus, trouble shooting, all demand occasional accurate determinations of existing conditions. Here are the most recent constants, and we believe the most accurate, for the densities of the gases commonly met in industrial work.

Results are expressed in terms of the weight in grams of a normal liter—that is the weight of a liter of the gas under consideration at 0 deg. C. and under a pressure of 760 mm. of mercury at sea level in latitude 45 North. (The value 980.665 agreed upon by the International Conference on Weights and Measures for the gravitational constant is used.)

Balloon and Volumeter Methods Employed

The first and most frequently used of the accurate methods for determining the densities of gases is that introduced by Regnault, which is called the "balloon method." (*Mémories de l'Académie*, 1847, vol. 21.) It consists of weighing a rigid container or "balloon" of known volume, first full of the gas, then evacuated. A counterpoise of equal volume was used by Regnault to compensate for the buoyant effect of the air and a correction was made for the compressibility of the gas, but not for the difference in the volume of the balloon full and evacuated. Rayleigh was the first to apply this correction. The famous laboratory of physical chemistry at the University of Geneva has probably carried this method to its greatest perfection. The more important features of the procedure as outlined by Guye are as follows. (See *J. Chim. phys.*, 1913, vol. 11, p. 320.) In all possible cases the gas is purified by fractionation and distillation. Two or three balloons, with walls of medium thickness and capacities of not more than 1 liter are filled simultaneously. After weighing they are evacuated only to 1 to 2 mm., the residual pressure being measured with a vacuometer. No correction is made for gas adsorption on the sides of the balloon, but the usual correction for compressibility and for gravity are applied to reduce the value found to the weight of a normal liter.

Probably the second in importance of the methods used for the determination of gas densities is the one commonly called the volumeter method. In this a known volume of gas is evolved from or absorbed in a weighted apparatus of relatively small volume. This allows a large volume of gas to be measured while avoiding many of the difficulties in weighing balloons with their large volumes and surfaces.

Density of Air Fundamental

A large number of important determinations have involved the relative weights of air and of the gas, the density of which was to be measured. Leduc, in particular, computed the specific gravities, referred to air, experimental values. [See *Ann. chim.* phys. (7), val. 15, pp. 90-93 (1898).] Leduc's computations involved a knowledge of the critical constants and the coefficients of compressibility of the gases. He determined the coefficients of compressibility experimentally, but, in most cases, he used the data obtained by other observers for the critical constants. This, of course, must be regarded as limiting the accuracy of his determinations.

By the introduction of the weight of a normal liter of air, a certain amount of accuracy is sacrificed, for although the density of air has been determined with the same care as the densities of other gases, the results obtained by the different observers do not agree as well as the results obtained by these same men for gases such as carbon dioxide, oxygen and nitrous oxide. The explanation for this is, according to Guye, the variation in the composition of the air in different places and at different times. (See *J. chim. phys.*, 1917, vol. 15, p. 561; also Jaquerod and Borel, *J. chim, phys.*, 1921, vol. 19, pp. 11-27.) It has actually been found that a decided increase in barometric pressure about the time the sample of air is taken will result in a decrease in the density.

The variations in the composition of the air from time to time in a given locality are greater than the variations with locality. The determination of the relative densities of air and another gas is generally simpler than the determination of the absolute density of either. For these two reasons the use of an average value for the weight of a normal liter of air for computing the weight of a gas which has been compared with air appears preferable to the use of a particular value obtained by the observer who made the comparison, unless the determination of the specific gravity of the gas and the absolute weight of the air were made at the same time.

The values of the weight of a normal liter of dry air free from carbon dioxide given by various observers are listed in Table I.

The average weight of a normal liter of air is ac-

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TABLE I—WEIGHT OF A NORMAL LITER OF AIR

Date	Weight Normal Liter of Air	Place	Observer	Reference
1806	1.2991	.....	Biot & Arago	*Mem. de l'Institute*, vol. 7, p. 301 (1806)
1847	1.29276	Paris	Regnault	*Mem. de l'Academie*, vol. 21, p. 143 (1847)
1879	1.29308	Munich	von Jolly	*Wied. Annalen* (2), vol. 6, p. 520 (1879)
1893	1.29284	Terling Place	Rayleigh	*Proc. Roy. Soc.* (Lond.), vol. 53, p. 134 (1893)
1898	1.29273	Paris	Leduc	*Ann. chim. phys.*, vol. 15, p. 1 (1898)
1912	1.29296	Geneva	Guye, Kovacs, Wourtzel	*J. chim. phys.*, vol. 10, p. 332 (1912)
1914	1.29297	Geneva	Germann	*J. chim. phys.*, vol. 12, p. 107 (1914)
1916	1.29273	Cleveland	Germann & Booth	Western Reserve Univ. Bull., 19, p. 15 (1916)
1921	1.2928	Geneva	Treuthard	*Compt. rend.*, vol. 172, p. 1598 (1921)
1922	1.29308	Madrid	Moles, Batuecas, Paya	*Anales, soc. espan. fis. quin*, vol. 20, p. 34 (1922)
Mean	1.29287	.....	.....	.....

The results preceding those of Rayleigh are of historical interest only and are not included in the calculated mean.

TABLE II—SELECTED VALUES FOR DENSITIES OF GASES WHICH HAVE BEEN ACCURATELY DETERMINED

Gas	Formula	Mol. Wt.*	Weight Normal Liter	Sp.Gr. Air = 1	Authority
Acetylene	C_2H_2	26.026	1.1791	0.9120	Stahrfoss
Air	.....	.....	1.2929	1	Average
Ammonia	NH_3	17.032	0.7708	0.5962	Guye
Argon	A	39.9	1.7824	1.3786	Ramsay, Leduc, & Schultze
Carbon dioxide	CO_2	44.005	1.9768	1.5290	Guye & Pintza
Carbon monoxide	CO	28.005	1.2504	0.9671	Rayleigh
Chlorine	Cl_2	70.92	3.214	2.4859	Jaquerod & Tourpaian
Ethane	C_2H_6	30.058	1.3565	1.0492	Stahrfoss
Ethylene	C_2H_4	28.042	1.2603	0.9748	Batuecas
Fluorine	F_2	38.0	1.695	1.313	Moissan
Helium	He	4.00	0.1785	0.1381	Taylor
Hydrogen	H_2	2.016	0.08987	0.06951	Morley
Hydrogen bromide	HBr	80.928	3.6443	2.8188	Moles & Reiman
Hydrogen chloride	HCl	36.468	1.6392	1.2679	Gray & Burt
Hydrogen sulphide	H_2S	34.076	1.5392	1.1905	Baume & Perrot
Krypton	Kr	82.92	3.708	2.867	Moore
Methane	CH_4	16.037	0.7168	0.5545	Baume & Perrot
Methyl chloride	CH_3Cl	50.489	2.3045	1.7824	Baume
Methyl ether	$(CH_3)_2O$	46.058	2.1096	1.6317	Baume
Methyl fluoride	CH_3F	34.029	1.5454	1.1953	Batuecas & Moles
Neon	Ne	20.2	0.9002	0.6962	Watson
Nitric oxide	NO	30.008	1.3402	1.0366	Gray, Guye, & Davila
Nitrogen	N_2	28.016	1.2506	0.9673	Gray, Moles
Atmospheric nitrogen	.....	.....	1.2568	0.9721	Rayleigh
Nitrous oxide	N_2O	44.016	1.9777	1.5297	Guye & Pintza
Oxygen	O_2	32.00	1.4290	0.1053	Several observs.
Phosphine	PH_3	34.064	1.5293	1.1828	Ter Gazarian
Propane	C_3H_8	44.079	2.0200	1.5624	Timmerans
Silicon tetrafluoride	SiF_4	104.10	4.6840	3.6229	Germann & Booth
Sulphur dioxide	SO_2	64.06	2.9267	2.2636	Scheuer
Xenon	Xe	130.2	5.851	4.514	Moore

* From International Atomic Weights for 1921-22.

TABLE III—SELECTED VALUES FOR DENSITY OF GASES WHICH HAVE NOT BEEN DETERMINED WITH GREAT ACCURACY

Gas	Formula	Sp.Gr. Air = 1	Weight Normal Liter	Authority
Arsine	AsH_3	2.695	3.484	Dumas, *Ann. chim.*, vol. 44, p. 288 (1830)
Carbon oxysulphide	COS	2.1046	2.7208	Von Than, *Ann. chim.*, vol. 15, p. 459 (1868)
Butane	C_4H_{10}	2.0063	2.594	Frankland, *Ann. chim. pharm.*, vol. 71, p. 171 (1849)
Cyanogen	C_2N_2	1.8064	2.335	Gay-Lussac, Gmelin Hdbk.
Hydrogen fluoride	HF	0.7126	0.9212	Thorpe and Hambly, *J. Chem. Soc.*, vol. 53 (1888)
Hydrogen iodide	HI	4.3757	5.657	Thompson, Gm. Hdb.
Hydrogen selenide	H_2Se	2.839	3.6702	Bruylants, *Bull. sci., Acad. roy. Belg'*, pp. 856-70 (1912) Bruylants & Dondeyne, *Bull. Acad. Belg.*, vol. 7, p. 387 (1922)
Hydrogen telluride	H_2Te	4.49	5.805	Ernyei, *Z. anorg. Chem.* vol. 25 (1900)
Methylamine	CH_4NH_2	1.08	1.396	Leduc, *Compt. rend.*, vol. 155, p. 206 (1912)
Nitrosyl chloride	NOCl	2.314	2.9919	Wourtzel, *Compt. rend.*, vol. 155, pp. 152-4 (1912)

cepted as 1.29287, and this value is used throughout this paper in computing the absolute densities of gases from the observed specific densities referred to air.

The selected value for the weight of a normal liter of each of the gases considered above is given in Table II. Each of these values has been very carefully determined and approaches the limit of accuracy obtainable with the methods in use at the present time.

Table III presents a collection of values of densities of gases which, for one reason or another, cannot be regarded as possessing the same degree of reliability as those presented in Table II. In most cases results are available from only one observer, hence no effort has been made to examine the data critically. A considerable number of experimental values for other gases have found their way into various tables of physical constants, but in nearly every case the determination was an approximate one made for the purpose of identifying the compound and is less reliable than the density computed from the atomic weights of the component elements.

Nickel Steels That Lack Expansivity

That and Other Properties of Such Alloys Described in Current Government Bulletin

A recently revised circular issued by the U. S. Bureau of Standards, and entitled, "Invar and Related Nickel Steels," furnishes much information of interest on the properties of nickel steels of relatively high nickel content. This information is compiled from many sources.

Particular attention is paid to "Invar," a nickel-iron alloy containing about 36 per cent of nickel and possessing an extremely small degree of thermal expansivity; and to "Elinvar," a recently developed alloy containing 36 per cent of nickel and 12 per cent of chromium or its equivalent. The latter possesses an invariable modulus of elasticity as well as a low thermal expansivity. These alloys are used largely in cases where non-variance of dimensions and elastic properties is required between the limits of temperatures ordinarily encountered (32 to 100 degrees Fahrenheit). They are used for measuring tapes in accurate surveying standards of length measurement, various parts of precise measuring instruments, parts of watches, clocks, chronometers, etc.

Nickel steels of different nickel content are used for a variety of purposes, such as gun tubes and other gun parts, pneumatic hammers and air drills, certain parts of gas engines, automobiles, airplanes, and other machines subject to severe stresses, boiler tubes, valves in sea water pumps, thermostats, rheostats, electric heaters, etc. Nickel steels of high nickel content possess the property of being highly resistant to corrosion by fresh water, sea water, and acid liquors. The circular gives considerable attention to the peculiar properties which permit these steels to be used for the purposes indicated.

These steels are described in Circular No. 58, Second Edition, of the Bureau of Standards, entitled, "Invar and Related Nickel Steels." Copies of this circular may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 30 cents.

Manufacturing Fuel *by the* Pure Coal Briquette Process

A Method of Low-Temperature Carbonization Which Depends for Success on the Preparation of the Coal Prior to Carbonizing—Results of Tests on the Coke Thus Obtained and Some Figures on Production Costs

By C. H. S. Tupholme
London, England

THE PRINCIPLE of this process of low-temperature carbonization is the preparation of the fuel before it is carbonized. The coal is ground and is mixed with crushed non-coking coal, coke breeze or coal which has been preheated to obviate swelling on carbonization. This mixture is briquetted at high pressure in the absence of a binder. The resultant briquets are either sold as fuel or utilized in the carbonization process.

The interesting features in this process are that carbonization can be effected without any swelling on the part of the briquets; and that the carbonized fuel, though lower in volatiles than, say, Coalite, will ignite easily, is smokeless, and gives off a high radiant heat during combustion. Another advantage is that the process of carbonization can be carried out either in special retorts or in the ordinary gas works retorts or coke ovens.

The coal in this process is washed to reduce the ash content to 5-6 per cent, either in an ordinary washer plant or, in the case of fines, by froth flotation; and is then passed on to driers of the static type. The dried coal is pulverized in tube or ball mills to pass a 1:30 mesh. The blending of the coal with a predetermined quantity of carbonized fuel, either coal or coke breeze, takes place in the mill. The briquets are then carbonized and the resulting coke is of high quality, finely grained and resembling an artificial anthracite.

Briquetting takes place in a press which produces an ovoid or other suitable shape of extreme hardness by a pressure of 10 tons to the square inch. If required, the fuel can be briquetted in blocks 10x7x5 in. weighing 15 lb. These ovoids or blocks are superior to briquets which incorporate a pitch or other binder; they are as hard as lump coal, will withstand severe handling and do not soften in a hot climate. Used as a fuel, the briquets are smokeless and make a good fire.

Methods of Blending

To secure an easily combustible fuel, slow carbonization is desirable; but, as Sutcliffe and Evans, the originators of this process, have pointed out, a very prolonged carbonizing period is, of course, not easy to reconcile with the economic requirements of a commercial development. But several methods are available which allow of the ready escape of the volatile matter. It can be done by (1) blending coal with coke breeze, (2) blending caking with non-caking coals, or (3) preheating a portion of the coal to eliminate the resinous matter and mixing the resulting material in the correct proportions with raw coal.

In order primarily to meet the economic requirements in large-scale production of smokeless fuel, Sutcliffe and Evans developed this method of preliminary briquetting of coal without a binder and subsequent carbonization of the briquets. In the case of most British coals swelling of the briquets during carbonization can be prevented by the addition of 20 to 30 per cent of previously carbonized material to the coal, but in the case of a few coals containing a high proportion of resinous material it has sometimes been found necessary to adopt the alternative method already mentioned.

The volatile products escape very readily from these mixtures and the preliminary treatment so facilitates the evolution and escape of the volatile matter that a hard, dense, smokeless fuel can be obtained practically at any temperature of carbonization from 500 deg. C. upward. Even when made at the usual gas-retorting or coke-oven temperatures, the coke produced can be ignited fairly readily and burns with absolute freedom in any type of grate.

Analyses of Briquets

There being no binding material and no added matter to make it into briquets, the analysis of the fuel before carbonization and the coal from which it is made are identical, thus showing that no chemical change takes place in the course of briquet manufacture. Below are shown the analysis of two Cardiff steam coals and the analysis of the briquet made from the same coal:

	Briquet, Per Cent	Coal, Per Cent	Briquet, Per Cent	Coal Per Cent
Fixed carbon	82.90	81.28	76.46	76.46
Volatile matter	13.90	14.30	20.74	20.49
Ash	2.76	3.70	2.56	2.36
Water	.44	.72	.24	.69
	100.00	100.00	100.00	100.00
Calories	7,700	7,590	7,810	7,920

When, therefore, the briquets are made from a smokeless variety of steam coal, they prove equally smokeless. Briquets made from house coal by this process burn admirably in a house fire grate and are considered superior to the large coal from the fines of which the fuel is made, owing to the fact that the briquets "cauliflower" in burning and make a most pleasing fire. This new fuel is open to none of the objections raised against pitch-made fuel, while it readily passes all the tests usually applied to the latter. It stands handling well; 112 lb. broken up into 18-oz. pieces and revolved in a cylinder, with obtruding obstructions of angle iron for 2 minutes, at 25 revolutions per minute, left 79 lb. on a 1⅝-in. spaced screen, or 70½ per cent. (The French navy test requires only 55 per cent to remain on the

screens.) After immersion in water for 4 years it shows no change. After exposure on the roof of a high building to the rain, frost and storms of the past 4 years, it shows practically no change.

What Boiler Tests Showed

Careful boiler tests, each of 24 hours, of best Welsh coal, pitch-made fuel and Pure Coal Briquettes respectively (all manufactured from similar coal) made at the South Wales Mining School show, according to the report, that the new fuel "gives a remarkably high value of the heat transmitted, and the weight of water converted into steam per square foot of heating surface." Further, that "the heat transmitted (per square foot of heating surface per hour) 4,650, as compared with 4,070 for large coal, and the weight of feed water (per square foot of heating surface per hour) 4.81, as compared with 4.22 evaporated per square foot of heating surface, is conclusive proof that this patent fuel will not only give good results as a fuel under ordinary conditions for steam-making purposes, but would be particularly valuable where rapid steam raising was necessary, or where a maximum quantity of steam had to be obtained from a minimum heating surface as in the case of marine work."

"Another important point with reference to the combustion of the fuel under test was the ease with which a regular, steady heat could be maintained and the fires kept clean when using the new fuel. The clinker formed with the fuel did not have the slightest tendency to adhere to the fire-bars, as was the case with the steam coal, although the amount of clinker was practically the same in each case."

A test of 5 tons of the fuel supplied in large briquets 10 in. in length, 7 in. in width and 4 in. in thickness was made by the French Admiralty, and as a result of that test the French officials were remarkably pleased with the fuel and expressed their view that it was superior to the best South Wales steam coal, and they were open to take large quantities of the material if it had been available and would prefer it to the best Admiralty steam coal.

Properties of the Briquets

The process seems to impart a very special burning quality to the fuel, inasmuch as the fuel is particularly active. Quite apart from the "cauliflower" effect produced on the briquets on burning are the peculiar properties possessed by the material left after the volatile matter has been driven off. The remaining coke or cinders seems to possess qualities of a somewhat similar nature to charcoal. It is not intended to imply in this remark that this fuel will take the place of charcoal, but simply that it carries some properties similar to charcoal in the way in which it is consumed in the grate.

Thus, in a house fire grate where these briquets are burned, the cinders or coke left after the volatiles have burned off will continue to burn until practically the whole of the carbonaceous matter is burned away. Thus, after the fire has apparently burned out with the exception of the fine ash remaining in the grate, if this is stirred up and raked the ash will fall through the grate and leave small individual lumps of the fuel still burning and glowing in very similar manner to charcoal.

The non-expanding properties of the fuel render it

FIG. 1—SPECIMEN OF PURE COAL BRIQUETTE SHOWING GRAIN

practicable for this fuel to be carbonized by heated gases in place of being carbonized by external heating of retorts. Special retort systems have been worked out for carbonizing this fuel which will permit of all the benefits of both high- and low-temperature carbonization being obtained; the method being to pass heated gases through a column of the prepared fuel, so that as this column of fuel gradually descends through the retort it is gradually heated up to the maximum temperature required for effecting the carbonization.

In this way the hot gases, which enter the retort at the base at between 800 and 1,000 deg. C., leave at the top of the retort at a temperature of 200 deg. C., the result being that volatiles given off from the fuel come off just at the temperature at which these volatiles are gasified. In other words, the retort really works by frictional distillation. The heating gas is obtained from a previous retorting, being stripped of tar, ammonia and light spirit.

It will be seen that all the oils and volatile constituents are obtained as in low-temperature carbonization, but as the fuel is subjected to high temperature at the lower end of the retort, a combination of the good properties of both high- and low-temperature distillation is obtained. In operating the retort system, all the gases taken off from the top of the retort would be passed through a condenser and washing plant, so as to effect the extraction of the sulphate of ammonia and the byproducts.

How the Retort Is Designed

The special retort is of the continuous vertical type with appropriate charging and discharging mechanism. In a four-retort plant designed to handle 1,000 tons per 24 hours, each retort of 250-ton capacity per diem is constructed with a vertical cylindrical chamber, lined with firebrick inclosed in heat insulation. Around this is built a casing of cylindrical gas-tight steel plates.

The retorts are fitted with two firebrick-filled regenerators, one regenerator being heated while the other is heating the gas utilized for the carbonizing process. The gas for heating the regenerators is burned at the bottom, the stack being open, until the required temperature is obtained. The damper is then closed, the burner supply is cut off, and the regenerator

is opened to the retort. The gas main is opened, the gas is passed through the regenerator to the retort, being heated in its passage. At the same time the other regenerator is heated up.

As will readilly be appreciated, carbonization is practically complete, 98 per cent of the volatiles being driven off in the passage of the briquets down the retort. These carbonized briquets flow continuously through the bottom of the retort.

The retorts are simple and cheap to construct, have no elaborate brickwork or flues, and the flue required to heat them is well under the usual figure of 15 per cent of the coal carbonized.

Composition of the Briquets

The resultant fuel varies widely in nature according to the degree of crushing and the proportions of the mixture. In fact, a variation of almost any degree may be obtained between a smokeless domestic fuel and a superior blast-furnace coke. The residual fuel is obtained in form differing only very slightly from the original briquet.

Though the temperature at the bottom of the retort during carbonization may have attained 1,800 deg. F., the residual coke will ignite and burn easily on a domestic fire. When ignited, the coke burns much like charcoal, to the center of the briquets, and will continue alight, even when taken off the fire, until practically the whole of the carbonaceous matter has been consumed. A typical analysis shows: volatiles, 1.3 per cent; fixed carbon, 84.5 per cent; sulphur, 1.9 per cent; water, 3.5 per cent; ash, 10.6 per cent. This sample had a hardness equivalent equal to the best Durham coke (98).

In this connection the following comparative table will be of interest:

	Foundry Coke	Gas Coke	Coke From Briquets
Ash	13.15%	17.9%	11.5%
Volatile matter	9.5%	1.3%	4.4%
True sp.gr.	1.81%	1.66%	1.79%
Apparent sp. gr.	1.28%	0.86%	0.8 to 1.1%
Volume of coke substances	70.7	21.8	21.4
Volume of cells	25.3	45.2	48.5
Burning Test:			
Weight of coke burned	12 lb.	12 lb.	12 lb.
Time taken in burning	4½ hr.	4 hr.	7½ hr.
Unburnt cinders	3 lb. 4 oz.	2 lb. 15 oz.	5 oz.

This coke has given satisfactory service in stoves of the anthracite type and also in gas producers. So far no large-scale tests in boiler furnaces have been made. From a theoretical point of view, however, it would seem that such a fuel has great possibilities in this direction, and might lead not only to economy in fuel cost but also to simplicity in the design of boiler furnaces.

As a blast-furnace coke, three important advantages are claimed for the carbonized briquet. The engineers of the process estimate that as much as 2 to 3 cwt. of coke per ton of produced pig iron can be saved in that the briquet coke so much resembles charcoal, and charcoal furnaces are more economical than the ordinary coke-fired type. It is also claimed that, as the briquet coke is extremely active and hard, its shape will be retained to the oxidizing section of the furnace, the result being an intense concentration of heat where this heat is most required.

Byproducts Obtained by This Method

The efficiency of this coke in practically all spheres proves Sutcliffe's and Evans' contention that the combustibility of low-temperature coke is not due so much to the volatile matter it contains as to its structure.

The yield of gas is naturally higher than is usual in low-temperature practice, and varies with the character of the inert gas used as a heating medium. In a recent test, for example, using steam as a heating medium, a Lancashire coal containing about 35 per cent of volatile matter gave the following remarkable results when carbonized at 750 deg.:

70 per cent of coke containing 5 per cent of volatiles of a free burning charac er.
53 lb. to 54 lb. of sulphate of ammonia per ton.
15 gal. of tar.
4 gal. of light oil, and in addition
17,000 to 18,000 cu.ft. of gas of a calorific value of 437 B.t.u. per cubic foot, he gas not containing more than 10 per cent of CO.

Generally the tar yield is from 15 to 25 gal. per ton, depending on the type of coal treated, and from 3 to 5 gal. of motor spirit is obtained. The tar is essentially a low-temperature tar and will find its best market as a fuel oil.

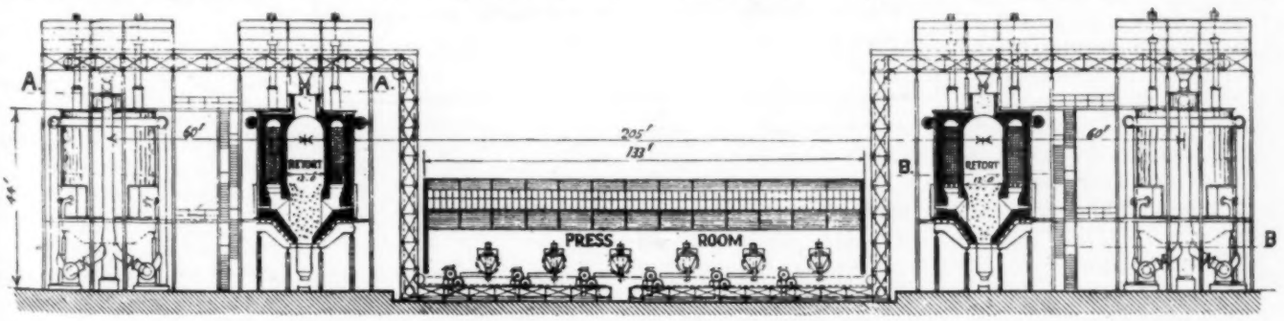

FIG. 2—SECTIONAL ELEVATION OF PRESS ROOM AND RETORT HOUSES IN PURE COAL BRIQUETTE PLANT DESIGNED TO CARBONIZE 1,000 TONS PER DAY

Owing to the porosity of briquets the yield of ammonium sulphate is high, amounting in fact to an excess of from 50 to 100 per cent of that obtained in gas works, or around 38 to 60 lb. per ton of coal carbonized. It is of interest here to note that a coal containing 1.5 per cent nitrogen when carbonized in the ordinary gas retort gave a coke with 1.45 per cent nitrogen; the same coal when treated by the briquet process gave a coke containing 1 per cent nitrogen.

As far as the cost of the process is concerned, the engineers estimate that on a plant to carbonize 100 tons a day the retorts would cost £15,000, the byproduct plant £25,000, the briquetting and drying plant £7,000, the total cost for a complete plant amounting to not more than £50,000.

Taking labor cost at 12s. per man per shift, the labor charge per ton on a plant carbonizing 100 tons a day would amount to somewhere around 2s. per ton. The raw material is cheap, and, including from 3s. 6d. to 5s. per ton for drying, grinding and briquetting, the total production cost of carbonization will amount to somewhere around 11s. per ton.

War-Time Manufacture of Tetryl

By W. Lee Tanner
Chief Chemist, High Explosives Plant, Bethlehem Steel Co., 1916-19

A glimpse behind the scenes, showing how one of many pressing war-time problems of chemical manufacture was solved. The methods of procedure and equipment, here employed, both in direct manufacture and in recovery, demonstrate clearly that when necessity demands, "the way out" can usually be discovered.

FOR certain kinds of detonating fuses the British Government in war time required composition explosive or tetryl to comply with Woolwich Arsenal standards; heretofore all the material made in this country had been of an inferior grade and had not met these specifications.

In order to produce the compound in the required purity, a number of nitrating processes were investigated, from which a method was evolved. One hundred pounds of dimethylaniline was rapidly run into 800 lb. of sulphuric acid (98 per cent) in a cast-iron vessel provided with an agitator. The mixture was stirred until sulphonation was completed. The sulphonated dimethylaniline and excess sulphuric acid mixture were conveyed by pipe lines to storage tanks directly over each nitrator in the nitrating houses.

The nitrators were lead-lined vessels provided with leaden coils placed in the pots for the circulation of cold water or steam, and torpedo agitators run at 250 r.p.m. These pots had covers of this sheet lead reinforced with iron bands and fittings; there were openings in them for the fume vent, thermometer well, etc.

Six hundred pounds of nitric acid (85 to 87 per cent) was run into the nitrator and heated by means of steam circulation in the coils to 50 deg. C., the agitator was started and the dimethylaniline sulphonic acid mixture slowly admitted through a cock controlled by an extending lever. The temperature in the reaction was permitted to rise to 85 deg. C., and water was run through the coils as required to keep this temperature. About 2 hours was needed to complete the mixture. Then it was further stirred for 1 hour and the temperature allowed to fall to 35 deg. C. The mass was run out into a lead-lined vessel (buggy), where it was permitted to settle for 6 hours, after which it was filtered on a Filtros bed, the acids being removed to the extent of about 70 per cent. The cake was next washed free from the acids in large wooden tanks with hot water, the product centrifuged and dried in a vacuum oven at 80 deg. C.

The purity of the crude product from the operation depended upon the quality of the raw materials entering the reaction. It was found that a product could be made to comply with the required standards without the necessity of crystallizing it. To this end the dimethylaniline must conform to a high degree of purity and be free from mineral matter; and the acids were necessarily nearly free from impurities and of uniform strength.

Each batch (product from one nitrator operation) was sampled and reported upon by the control laboratory before it was mixed with other batches for washing and drying; this prevented any imperfectly nitrated material going into the wash-house batches. These latter consisted of about 1,000 lb. of product, and were released by the laboratory for transportation to the dry-house, when the tests showed the acidity had been removed to the required degree.

These tests were to determine quickly the condition of the product, and as accurately as possible, yet certain limitations were permissible. The samples taken from the receiving vessels or settling tanks were examined as follows: About 10 c.c. of the mass was placed in a test tube and heated in a steam bath to 95 deg. C. for 20 minutes; if no copious fuming occurred, the batch was passed; if the test indicated the nitration was incomplete, it was ordered to be returned to a nitrator and reheated with agitation. The wash tank samples were tested for acidity by a prescribed procedure which was analogous to the method for determining free acids in the dry product. The dry-house samples were tested by a rapid method for calculation of moisture, utilizing a water-free hydrocarbon. Dry-house batches consisted of about 5,000 lb. of tetryl and went to the packing house in this size. This quantity constituted a packing batch or lot and was sampled for complete analysis.

These tests were made in accordance with general specifications as given by the buyer. They included the following determinations: Moisture and volatile matter, insoluble matter (given solvent, usually acetone), ash or mineral matter, melting point, freezing or solidifying point, acidity, nitrogen (total), and decomposition (volatile emanations at certain temperatures). Other requirements concerned degree of fineness, color, uniformity of crystallization, etc. Many of the tests were made by arbitrary methods found applicable.

A thorough chemical control of the raw materials and intermediates in the process made possible the production of a pure tetryl that did not require to be crystallized from a volatile solvent and met all requirements of the inspection.

Recovery of Acids

The recovery of the spent acids was investigated and a successful unit was put into operation. Absorption of the fumes of nitrous oxide and nitric oxide from the nitrators by counter-current of milk of lime in a tower under partial vacuum was successfully tried out on a large scale. The acid filtrates were denitrated by a novel means, involving low temperatures, which effected a high recovery with safety.

The recovered nitric acid was concentrated by a new method in which it was planned to combine the lime nitrate sludge from the tower absorption with the denitration distillate. In this process use was made of the reaction of double decomposition between manganese sulphate and calcium nitrate, whereby manganese nitrate was retorted to produce fuming nitric acid (87 per cent), the residuum being manganese dioxide, which was reconverted to sulphate, then nitrate, making the process continuous. It was intended to produce all the nitric acid needed from Norwegian nitrate of lime and utilize our waste nitric acid in the same plant. Some of the sulphuric acid would be lost, but nearly all of the nitric acid would be saved.

Useful Facts About
Applying for a Patent

How to Protect Your Invention — The Information Required by the Lawyer and Why It Is Necessary— The Legal Value of Records and Drawings—Approximate Cost of Obtaining a Patent in This Country

By D. B. Keyes
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THE American chemist is fast becoming our most prolific inventor. In spite of this situation, few of our patent lawyers are well educated in chemistry and few chemists are at all versed in patent law, Naturally, this ignorance has resulted in the issuance of many defective patents as well as a general distrust on the part of the chemist for the patent lawyer and patents.

It is rather a hopeless proposition to teach chemistry to the patent lawyer, but it is possible to teach the chemist enough of the rudiments of patent law so that the two may work together effectively. An analogous case has been similarly worked out with the man who sells chemicals. It has been found far easier to teach salesmanship to technical men than to each chemistry to salesmen.

In picking one's lawyer it is not always possible to get the best, and the majority of chemists must be satisfied with a lawyer who is unfamiliar with chemistry except in a very elementary way. It is, therefore, expedient for the chemist to know something of the requirements for the preparation of a good patent application that will thoroughly cover his invention. In large organizations it has been found desirable to assign to a single chemist the responsibility of seeing that the patent lawyers receive all of the necessary data for the preparation of patent applications and for minor litigation. Given herewith is a form listing the questions which briefly summarize the data necessary for the preparation of a patent application.[1]

Picking Out the Inventor

The inventor's name must appear on the patent. It is often not an easy matter to determine just who the inventor really is, but he must be found, otherwise the patent is invalid and worthless. The first question, with its five subdivisions, if correctly and completely answered will yield sufficient data for the lawyer to decide the matter and it should always be left to his judgment. Usually if several research men are working on different phases of the same basic idea, these data will disclose several worth-while inventions and the lawyer will be able to allocate each invention to separate inventors.

Oral suggestions give the most trouble, because it is difficult for the men to remember exactly what was said and the date, especially if a long time has elapsed. If the research men will acquire the habit of making a note of any suggestion offered them which they intend to try out, much of this difficulty can be avoided.

The research chemist who furnishes a complete and workable idea is often prone to refuse the credit if some one else has worked out the details in the laboratory. This attitude is difficult to overcome, and is best handled by discovering if possible a patentable idea in the detailed work. Both the originator and the investigator then become inventors and harmony is restored. The realization that a strong patent situation usually exists only when there are several inventions covering the same subject will do more than anything else to bring about a correct attitude toward patents and stimulate further research.

Legal Value of Records

Notebook records should be as complete as possible. They should be written in ink and all important records should be witnessed by three people who understand their significance. Each experiment should be dated. This may seem a rather foolish precaution and the excess cost may appear unwarranted, nevertheless litigation is a costly procedure and these precautions often pay for themselves many times over in infringement and interference suits. The title to a patent must be clear and no means should be spared to have ample proof on file at the time the patent application is taken out. The owner of the patent is not necessarily the inventor, as the latter may assign his rights for a consideration to any one he sees fit. This is merely a business proposition and can be agreed upon before or after the invention is made.

If drawings illustrate the invention, they become important information. They should be made in the notebook. The more the better, because they are a shorthand description of the process. They should be dated and in some cases witnessed. The notebook should not only contain drawings and descriptions of experiments but also any drawings and descriptions of ideas that may have a future value.

The various dates asked for under question 2 are important not only in determining the inventor but in case of interference or infringement. The date of the original conception of the invention is the most difficult to discover. In large organizations it sometimes means a cross-examination of every one concerned. If the exact date cannot be discovered, the limiting dates should be found and recorded.

The date of the reduction to practice of the invention is the date upon which the process was first successfully operated or the composition first made. If this has not been done, it becomes the date upon which the patent application was taken out. The other dates are usually easily ascertained.

After the application is taken out it is desirable that the inventor make an affidavit covering the material asked for in questions 1 and 2.

[1] This list was prepared by Arthur Wright, patent lawyer of New York City, to whom the author wishes to acknowledge this courtesy

REQUISITES FOR THE PATENT APPLICATIONS

1. Data from which to determine who is the inventor, the subject matter and the dates.
   (*a*) References to oral suggestions made concerning the invention.
   (*b*) References to written suggestions concerning the invention.
   (*c*) Notebook references to the invention.
   (*d*) References to reports about the invention.
   (*e*) References to all drawings made illustrating the invention.
2. The dates relating to the making of the invention.
   (*a*) The date of the original conception of the invention.
   (*b*) The date upon which the first drawings of the invention was made.
   (*c*) The date upon which the first written description of the invention was made.
   (*d*) The date upon which the invention was first disclosed to others.
   (*e*) The date of the reduction to practice of the invention.
3. A detailed description of the invention, including a full connected description containing proportions of materials used, extreme limits of temperatures and all other necessary and desirable conditions, as well as alternatives that are available.
4. A drawing of apparatus for use with the invention is to be attached in case a drawing would illustrate the invention.
5. The new features of the invention.
6. The advantages of the invention.
7. The closest references to the invention in the prior art and copies of the closest references are to be attached in case the writer has them.
8. The date when this memorandum was written.
9. Signature with full name, residence, post office address and nationality of the writer.

Our patent laws require the patent application to disclose enough information so that one "skilled in the art" can operate the invention. It is a debatable question just what can and cannot be expected of one skilled in the art. It is the natural tendency of the inventor not to wish to disclose any more than he is obliged to. It is a good policy, however, to tell the lawyer everything, to emphasize the important features of the invention and to explain exactly why they are important. Questions 3, 4, 5 and 6 ask for these facts.

It should be noticed in question 3 that alternatives are requested. It is extremely important that the inventor appreciate the possibilities of broadening his invention by changing to the limit every factor involved. By factors is meant not only the substances involved but also pressure, temperature, concentration, time, etc. It is also important that he recognize the limits of his invention, because if he allows his fancy to carry him too far without checking up by experimentation, he will find parts of his patent are invalid due to incorrect claims. (See "Method in Research," *Ind. Eng. Chem.*, vol. 15, No. 1, p. 82, January, 1923.)

In making the drawing asked for in question 4 it is again desirable to give as much detail as is practical. This drawing will be copied in the patent specifications and it improves the specifications if the accompanying drawing represents a workable commercial layout and not a crude laboratory outfit.

The features and advantages of the invention should be given very careful thought and no pains spared to make clear to the lawyer just what they are, because it is chiefly from these data that the lawyer makes up the patent claims. The latter are vital parts of the patent and its value will be determined by them. It is worth while for the inventor to look over the claims when they are drawn up to make certain that all of these new features and all of their possible combinations are claimed. This will be difficult at first, but as the inventor becomes more familiar with patents he will be able to see the possibility of additional features and claims.

It is taken for granted that the inventor appreciates the advantage of a thorough patent and literature search before the application is drawn up. References to the invention in the prior art as required in question 7 will influence the character of the claims and therefore affect the value of the patent.

How Much Will It Cost?

Before taking out a patent application the chemist is interested in how much it is going to cost. The U. S. Patent Office requires two fees of $20 each, one when the application is filed and the other when the patent is issued. These fees are, however, a small part of the total cost, because the lawyer must not only spend time and thought on the preparation of the application, but he must undertake and carry to a conclusion the prosecution with the Patent Office. This prosecution varies greatly in its extent, and this is the chief reason why the cost of a patent is not a fixed amount. It has been found that approximately $500 is a fair average for the cost of a United States patent.

Foreign countries usually impose a periodic tax on their patents, and also a charge on patents that are not worked within the country. The patent laws of the foreign countries vary and it would not be worth while to review them here. Most patent lawyers, however, have foreign associates and it is a simple matter to get any detailed information from them when required.

Synthetic Urea From Mixed Nitrogen

During the war the Germans erected near Merseburg, in the Province of Saxony, the great chemical plant known as the Leuna Works. This establishment covers an area of approximately 1½ square miles and employs 18,500 men. It was designed for the purpose of extracting nitrogen from the air. This product was intended exclusively for agricultural purposes. Present plans are to devote a large portion of the plant to the manufacture of synthetic urea $CO(NH_2)_2$ by the Haber and Bosch processes. It is probable that the urea will be converted into the nitrate of urea containing 46.6 per cent of available nitrogen, which the Germans claim will be the principal source of nitrogen in the fertilizers of the future.

Machinery and Appliances for Production and Control

Equipment News

From Maker and User

Materials and Accessories for Chemical Industries

Grinding 1,000 Tons of Ore per Day on 80-Kw. Input

By Chester A. Gauss
SKF Industries, Inc.

One thousand tons of copper ore pulverized in 24 hours on a single mill with a motor input of only 80 kw. is what is being accomplished by the Cananea Consolidated Copper Co. of Cananea, Mexico. This production is obtained from each of two 6x12 in. mills furnished by David Cole, consulting engineer, El Paso, Tex.

The mill itself is a cylinder which is charged through an opening in one end. Within the cylinder are steel rods lying longitudinally and which aggregate 40,000 lb. in weight. When the mill rotates, the rods and ore cascade down one side and the ore is pulverized. By using rods, more uniform pulverizing is obtained than with balls and then, too, when the rods are worn down below the point of usefulness for pulverizing, they can be salvaged for other service.

Around the circumference of the cylinder is a riding ring which rests on six rollers, connected by links in the form of a chain supported at its ends. Each of the six rollers is supported by two SKF self-aligning roller bearings which are responsible in a large measure for the high efficiency and reliable performance of the mill.

The total weight of the cylinder, rods and charge of ore is 100,000 lb., of which 85,000 lb. is carried by the roller chain, placing a load of approximately 8,000 lb. on each of the twelve self-aligning roller bearings. Normally the cylinder revolves at 16 r.p.m., necessitating a roller speed of 106 r.p.m.

As compared with other types of machines equipped with sleeve types of bearings, this roller-bearing equipped mill requires approximately 35 per cent less power. Some idea of the magnitude of this saving can be obtained by remembering that it corresponds to a saving in power input of 43 kw. Assuming that electric energy can be obtained at the low rate of 2½ cents per kilowatt-hour, this corresponds to a saving of $10.75 per day of 12 hours, or of $3,923.75 per 365 day year of 12 hours a day operation.

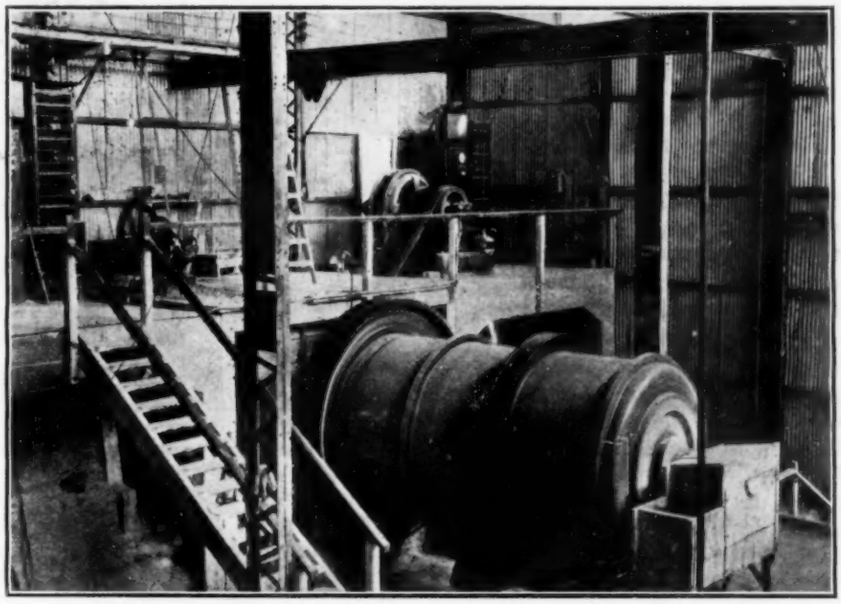


FIG. 1—ONE OF THE 6x12 IN. ROLLER ROD MILLS INSTALLED AT CANANEA, MEXICO. PRODUCTION 1,000 TONS IN 24 HOURS. POWER INPUT 80 KW.

With power costs forming such a large percentage of the cost of pulverizing ores, this saving of approximately 35 per cent has a substantial effect upon total cost of reducing ores.

Another advantage claimed for this type of mill is the fact that lubrication troubles and those experienced as a result of the dirty, gritty conditions under which pulverizing mills must operate are avoided. Large lubricant reservoirs are provided for the roller bearings and, since the housings are leak-proof, lubricant need be applied only at infrequent intervals. The housing seals which keep the lubricant from leaking out also prevent dust and grit from finding their way into the bearings and acting as a potent force of destruction.

Shut-downs for bearing adjustments such as are required with plain-bearing equipment are thus avoided. This non-wearing feature of self-aligning roller bearings is one that appeals greatly to mills that are located at places difficult of access and also to those that are far from sources of supply.

Since the use of SKF self-aligning roller bearings plays such a large part in the efficiency and reliability of this mill, the design and characteristics of this type of bearing, which differ greatly from those of conventional types, are of special interest.

This recently developed bearing is a self-contained and self-aligning unit. The former feature means that when the bearing is being installed no internal adjustment of the bearing is required, thus precluding the possibility of damage through initial maladjustment while installing. A spherically ground outer race provides for self-alignment of the bearing to compensate for shaft deflections and unavoidable inaccuracies in machining and locating the housings. These two features are of particular importance in the field of heavy machinery for which the bearing was designed. Greater detail is impossible in so short space.

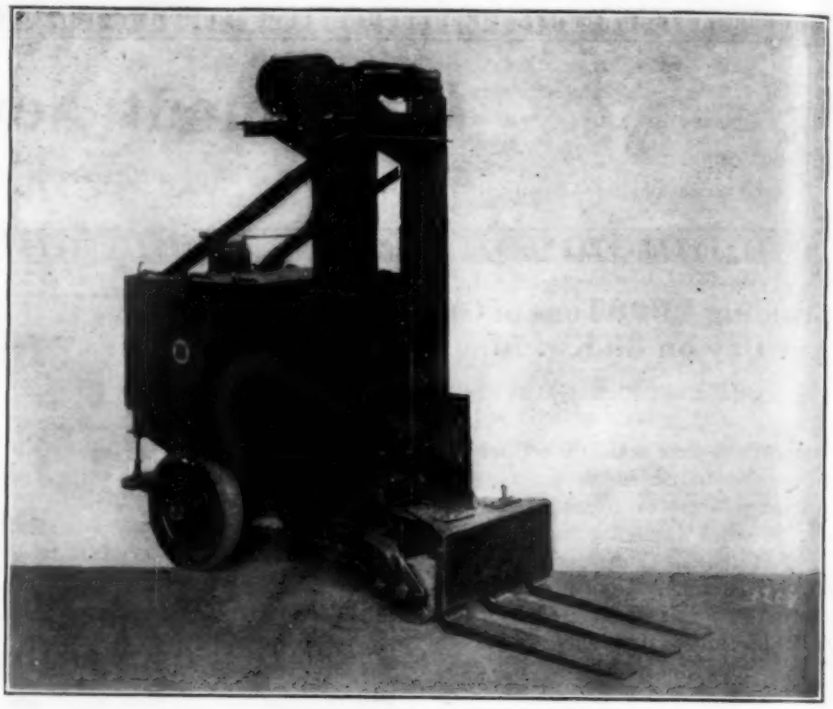
A Tiering Truck for Sheets and Plates

A new model tiering truck has been placed on the market by the Lakewood Engineering Company. Following the development of its original Tier-Lift in 1920, there came a demand for the handling of such commodities as sheet tin, taking into consideration the loading of the tin at the mill and the unloading and storing at the factory.

The use of platform skids for carrying the load in the freight car called for so large a quantity that the investment charges wiped out the considerable savings otherwise effected. Through several stages, this led to the development of a modified Tier-Lift as shown in the accompanying photograph.

The new fork Tier-Lift can pick up 2,000-2,500-lb. loads which are placed on 2x2-in. strips, thus eliminating the skid investment. The tin is placed on these strips in the car at the mill and a similar truck unloads the tin at the plant and stacks in 2,000-lb. units, three high. With a travel of about 125 ft., an operator and a helper can unload a 35- to 40-ton car of tin in about an hour and a quarter.

The application of this unit to other commodities is possible with the attendant saving of the investment on skids. The driving and lifting mechanism of the truck is standard and the forged steel forks or arms are placed on the truck to meet the user's requirements in the handling of commodities such as flat paper, barrels, radiators, dies, etc. The truck is made in various heights.



THE LAKEWOOD FORK TIER-LIFT TRUCK

A Method of Preventing Corrosion

A new method of electroplating which has recently attracted much attention because of its efficacy in preventing atmospheric corrosion of steel has been perfected by the Udylite Process Company, Kokomo, Ind.

The process consists in electroplating iron or steel articles with a thin coating of cadmium, from 0.0001 to 0.001 inch in thickness. After plating the coating is baked in, the article being kept for several hours at a temperature of 300 deg. F. to 400 deg. F. This causes the cadmium to penetrate the iron and form an alloy which is resistant to corrosion.

The deposit is a flat white. If a bright deposit is desired this can be obtained by air agitation of the plating solution. When an article which has been processed in this way is buffed with a soft, unstitched buff a color very close to that of silver is brought out.

If the natural finish is not desired, some other metal can be plated over the cadmium plate, such as nickel, silver or gold. It is claimed that an article treated in this manner resists corrosion much longer than when these metals are deposited directly over the base metal or over a copper deposit. Nickel over Udylite will stand up at least ten times as long in a salt spray test as will nickel directly over iron or over copper plating.

A "Udylited" article has, then, a base metal core, a thin skin of cadmium-iron alloy and an external skin of metallic cadmium. If a thin sheet so treated is flexed there is no evidence of flaking, surface cracks, or checks. Iron wire properly processed can be twisted until it breaks without showing any evidence of raising the coating. This is of interest, as hot or cold galvanized articles cannot be twisted many turns without raising the coating. Articles such as precision screws can be processed without destroying the accuracy of their fit when the tolerance is over 0.0002 inch.

Paints and other coatings adhere at least as well to Udylited surfaces as to iron surfaces. Rust cannot form under these coatings and flake them, nor will rust form in cracks in the paint or other surface. Springs, tempered round or flat rods, cutlery, etc., can be processed without impairing the physical properties of the steel. The resistance to alkalis and to acids is better than in the case of galvanized articles, though there is some corrosion and the common mineral acids should not be used in direct contact.

The cost of using this process is 2½ cents or less per square foot. The Udylite Process Company installs the equipment in the customer's plant and thereafter charges a small royalty in connection with supplying the proper cadmium salts for the bath. These royalties are per lb. of salt used and are payable quarterly. There are a number of installations already in operation, particularly in the automobile accessory field.

Catalogs Received

UNITED STATES OZONE CO., Scottdale, Pa.—Bulletin 40. A bulletin describing the laboratory size ozonizers.

ESTERLINE-ANGUS CO., Indianapolis, Ind.—Bulletin 623. A bulletin describing the anemometer manufactured by this company for use in finding the velocity of a current of air.

PENNSYLVANIA PUMP & COMPRESSOR CO., Easton, Pa.—Catalog 104. A new catalog covering the straight line air compressors manufactured by this company in capacities up to 875 cu.ft.

Readers' Views and Comments

An Open Forum for Subscribers

The editors invite discussion of articles and editorials or other topics of interest

Transportation About Industrial Plants

To the Editor of Chem. & Met.:

SIR — While M. W. Potts' article "How the Railless Railroad Solves the Unskilled Labor Problem," in *Chem. & Met.* for June 18, refers especially to tractors and trucks, the possibilities of the overhead monorail should not be overlooked. Several months ago I visited the zinc smelter of the U. S. Steel Corporation at Donora, Pa., adjacent to the works of the American Steel & Wire Co., which uses much of the spelter in galvanizing wire. Here, the noticeable feature was an almost entire absence of surface track, there being a complete system of overhead monorail encircling the works. The system is a great success, and besides leaving the surface clear, the hazard of being run over or injured by a locomotive and cars is eliminated. In the wire mill mentioned, they use electric tractors and trailers on the floors for speedy removal of finished products.

M. W. VON BERNEWITZ.
U. S. Bureau of Mines Station,
Pittsburgh, Pa.

American Institute of Chemistry

To the Editor of Chem. & Met.:

SIR—After a 3 months' absence in Europe, a part of which time was spent in inquiry into the workings of the British Institute of Chemistry and more in considering the problems of the corresponding American organization, a word or two of a general character addressed to the chemical profession may be in season.

The fact which impresses me most strongly is that if the American Institute of Chemistry is to attain the high place and fulfill the purpose of its organizers, the membership must recognize the magnitude of their task and realize some of the difficulties in their way. It is not with the idea of discouragement of interest that the following suggestions are made, but in the hope that we may feel encouraged even if but slow progress is made.

The Institute of Chemistry of Great Britain and Ireland has had a long and honorable career, but yet, even after 50 years of effort, it is still far from reaching the ideal position such an organization may ultimately hope to attain. It had the advantage that it was started and its early career fostered by the best and most prominent chemists of their day. We of the American Institute, on the other hand, must recognize a fact, which has been publicly proclaimed, that leading American chemists thus far have taken but scant interest in our project. We must therefore expect that our attainment of public recognition will be a matter of slower growth and result only from years of work. Our present membership should regard themselves largely as pioneers in a movement the full fruition of which will come only to a second or third generation of chemists. This fact should be encouraging to all who are altruistic in mind and should help to keep from our membership those whose present purpose is chiefly personal advantage. If one is to draw lessons from the experience of our English brethren, we shall find that our best approach to public esteem within and without the profession, without which we can do but little, will be gained only by a careful scrutiny of the personal qualification of those we admit to the fellowship. A few unqualified or unworthy fellows can do almost irreparable damage. It is desirable, therefore, that all those at present in the institute should render every assistance in their power to secure proper and adequate scrutiny of future additions and endeavor in every way, personally and collectively, to uphold the dignity of the profession and of the institute.

It is not to be expected that our experience would duplicate or even follow the lines of the British Institute, but it is worth while to recognize the fact that two activities have had the largest part in bringing them to their present high place in public esteem and enable them to be a real benefit to their personnel and the profession of chemistry itself. These are their system of examinations and their register of employment. It is extremely doubtful if American conditions and the present status and equipment of the institute would warrant any attempt to follow their examination system, but it is certain that it merits close study and it is probable that such study would evolve a plan through which the general public would be able to know a real chemist when one is so labeled by the American Institute. In this connection it is well to know that the chemists of Great Britain labor under the handicap that the legal right to the title chemist is held not by the chemist but by the pharmacist. It is possible that under our conditions the best and most feasible means of establishment of minimum standards is by legal specifications such as have been sought and obtained by other professions. If this proves to be the case and is accomplished, then our purpose should be to go above and beyond those for our membership.

The register of employment is a very interesting type of employment bureau and may be very well used by us in modified form. There is no attempt to serve those seeking employment individually as is done with us nor to collect fees for any service rendered, but every effort is made to keep a constantly accurate register of posts to be filled and of salaries paid, and these, with means of access satisfactory to employers, are made available to all those on the register of persons seeking place or preferment. It seems to be a most satisfactory arrangement and no doubt could be adapted to our conditions with comparative ease.

Altogether I come home with high hope that if we can be content with a small membership and modest aspirations for the present, if we can remember constantly that friendly co-operation with existing organizations must be our purpose and if we are content to grow in stature as we grow in spirit and experience, the American Institute may be all that its altruistic minded members hope it may become. It is to be desired that those who have or may come into it with other aims may speedily eliminate themselves.

HORACE G. BYERS,
President, Am. Inst. Chemistry.
Department of Chemistry,
Cooper Union, New York.

Fixation by Hydrolysis?

To the Editor of Chem. & Met.:

SIR — Like the perpetual motion machine in the patent literature, the notion that a catalyst has shifted an equilibrium recurs once again. And in this case, your contributors, Dr. Falk and Professor McKee, are quite specific. For, in their article of Aug. 6 last, "Fixation by Hydrolysis?" the burden of the task is laid upon elementary iron, a wire nail, to wit. It is apparently accepted by the authors that the reaction in question is hydrolysis of the simple type

$$N \vdots N + 2H_2O = NH_4NO_2$$

and reversible. They are aware also that Lewis and Randall calculate that for an equilibrium concentration of ammonium nitrite equal to 10^{-6} molar a nitrogen pressure of 10^{31} atmospheres would be necessary unless the two laws of thermodynamics are to be coolly thrown overboard or unless, as they state in footnote 3, the energy is "furnished by a third substance such as the iron used as 'catalyst' in the present experimental work." Now, since approximately this concentration of ammonium nitrite was found by the authors at 300 lb. pressure of nitrogen, one or other alternative is necessary if the hydrolysis is of the simple type. If the latter alternative, for I cannot believe they would consider the former, what happened, pray, to the iron, while furnishing the energy? Did the electrons fall into the nuclei of the iron atoms, one conceivable way in which the energy might be furnished? But if so, what did the iron atoms look like after their prodigious efforts?

Princeton, N. J. HUGH S. TAYLOR.

Review of Recent Patents

Developments in Producing Some Industrial Chemical Products

Improved Technology for Acetic Acid, Sulphur Chloride, Gypsum and Benzoic Acid Reflected in Recent Inventions

AN improved process for the production of acetic acid in higher concentration than usual is described by Henry Howard in Patent 1,463,212, issued July 31, 1923, and assigned to the Grasselli Chemical Co. In order to give a clear understanding, it seems advisable to consider some of the prior processes for the manufacture of acetic acid. A common process for the manufacture of acetic acid consists in decomposing calcium acetate in a solution of a strong mineral acid, such as a solution of sulphuric or hydrochloric acid, and distilling acetic acid from the resulting reaction mixture. For example, calcium acetate is mixed with hydrochloric acid solution of say 22 deg. Bé. in quantity sufficient to decompose the calcium acetate and liberate the corresponding quantity of acetic acid, and the reaction mixture is distilled, the distillation being completed by blowing live steam through the reaction mixture. The yield and quality of acetic acid obtained by this method are excellent, but the acetic acid solution obtained is weak, running, for instance, around 30 per cent acetic acid.

Attempts have been made to produce a stronger acetic acid product by using less water in the reaction mixture than is supplied thereto by a solution of hydrochloric acid of about 22 deg. Bé. It has even been attempted to produce glacial acetic acid by treating dry calcium acetate with anhydrous hydrochloric acid gas. Such attempts, however, have not been commercially successful, presumably because the reaction mixtures employed did not contain sufficient water to permit a sufficiently complete liberation of acetic acid by the interaction of the hydrochloric acid with the calcium acetate. When the water content of the reaction mixture is too limited, the yield and quality of the acetic acid distillate are poor and an excessive amount of hydrochloric acid distills along with the acetic acid.

The process comprises decomposing acetate of lime with a solution of mineral acid containing sufficient water to permit the completion of reaction, distilling the reaction mixture, collecting a first strong acetic acid fraction which is set aside as the final product, and then collecting a second weak acetic acid fraction which is used as the reaction vehicle or solvent in a subsequent operation.

The process may be carried out in the following manner:

To start the process acetate of lime is dissolved in a solution of hydrochloric acid of the usual strength, say 22 deg. Bé., in quantity sufficient to neutralize the acetate of lime, and the reaction mixture is distilled, the distillate being collected in the first or earlier stage or stages of the distillation in the form of a solution of acetic acid of, say, 50 per cent or greater strength, and the distillate in the later stage of the distillation being separately collected in the form of a weak acetic acid solution of, say, 20 per cent strength or less.

The distillation is carried as far as is practicable by indirect heating and then is completed preferably by the continuation of the indirect heating in conjunction with the blowing of live steam through the reaction mixture. The use of direct steam is practically necessary in order to complete the recovery of acetic acid from the charge, but since the use of direct steam introduces water into the distillate, it should be limited so as to produce a dilute acetic acid solution containing only the quantity of water required in a subsequent batch.

In distilling the mixture, a small amount of hydrochloric acid sufficient to contaminate seriously the acetic acid product may distill along with the acetic acid. In order to prevent the hydrochloric acid from entering the acetic acid product, the gases leaving the still and consisting essentially of acetic acid, water and a small amount of hydrochloric acid are passed through

American Patents Issued August 21, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,465,273—Blast-Furnace Top. W. Lawson Kluttz, Birmingham, Ala.

1,465,275-6—Foundry Plant. J. B. Ladd, Ardmore, Pa., assignor to United States Cast Iron Pipe & Foundry Co., Burlington, N. J.

1,465,277—Apparatus for Extracting Oil From Shales. J. Mayes and R. Hombighous, Wichita, Kan.

1,465,310—Process for the Fixation of Atmospheric Nitrogen. W. A. Nelson, Nashville, Tenn.

1,465,317—Colored Artificial Asphaltum. D. Sanguinetti, Buenos Aires, Argentina.

1,465,347—Process of and Apparatus for Forming Glass. R. M. Corl, Maumee, Ohio, assignor, by mesne assignments, to Erie Glass Co., Toledo, Ohio.

1,465,397—Gas Scrubber. H. G. Johnston, Corsicana, Tex.

1,465,398 — Apparatus for Preparing Oil for Electric Treatment. G. C. Kelley, Taft, Calif.

1,465,471—Fluid-Pressure Device. H. B. Graham, San Jose, Calif.

1,465,545—Manufacture of Articles of Glass and the Like. M. A. Demongeot, Paris, France; J. Neadle, administrator of M. A. Demongeot, deceased.

1,465,565 — Process for Extracting Resin From Wood With the Aid of Oil of Turpentine. E. Scheller, Stolp-on-the-Pom, Germany, assignor to Albert Luck Siassfurt-Leopoldshall, Germany.

1,465,572—Tunnel Oven or Kiln for Firing Pottery and Other Ware. C. E. Bailey, Lawton, England.

1,465,579—Pulp-Making Machine. H. E. Ellis, Leesburg, Fla.

1,465,595 — Manufacture of Chlorhydrin. R. T. Brooks, Bayside, N. Y., assignor, by mesne assignments to Carbide & Carbon Chemicals Corp.

1,465,598-9—Process for the Treating of Hydrocarbons. J. H. C. de Brey, The Hague, Netherlands.

1,465,600—Process of Separating Olefines From Gaseous Mixtures. B. E. Eldred, Long Island City, N. Y., assignor by mesne assignments, to Carbide & Carbon Chemicals Corp.

1,465,601—Process and Apparatus for the Manufacture of Chlorhydrins. B. E. Eldred, New York, and B. T. Brooks, Bayside, N. Y., assignors, by mesne assignments, to Carbide & Carbon Chemicals Corp.

1,465,603—Composition for Impregnating and Preserving Wood. L. Gohmert, Cuero, Tex.

1,465,673—Art of Dehydrating Gaseous Fluids. O. Luhr, Chicago, Ill., assignor to Luhr & Friedl, Chicago, Ill.

1,465,677—Process of Preparing Dithiocarbamic Compounds. S. B. Molony, Wellesley Hills, Mass., and Y. Nikaido, Bay City, Mich., assignors to Michigan Chemical Co.

1,465,689—Manufacture of Oxy and Sulpho-oxy Derivatives of Anthraquinone. D. Segaller and D. H. Peacock, Huddersfield, England, assignors to British Dyestuffs Corp., Ltd., Blackley, Manchester, England.

1,465,743—Vulcanization of Rubber. C. H. Stevens, Newark, N. J., and C. H. Eaton, East Palestine, Ohio; said Eaton assignor of eight-twentieths to A. R. Knight, New York, N. Y., one-twentieth to S. R. Clark, Springfield, Mass., and one-twentieth to D. P. Swisher, Oil City, Pa.

1,465,752 — Manufacture of Gasoline. R. Yates, Passaic, N. J.

1,465,833—Process of Making Cement and Byproducts. E. Anderson, Los Angeles, Calif., assignor, by mesne assignments, to Western Precipitation Co.

1,465,834 — Process for Recovering Potassium Compound in Connection With Cement Manufacture. E. Anderson, Los Angeles, Calif., assignor, by mesne assignments, to Western Precipitation Co.

1,465,841-2 — Process of Obtaining Water-Soluble Potassium Compounds. R. D. Cheesman, Chelsea, Mich., and R. C. Haff, Hagerstown, Md., assignors, by mesne assignments, to Western Precipitation Co.

1,465,853—Manufacture of Condensation Products From Carbazole and p-Nitrosophenol and Its Derivatives. W. Lewcock and S. B. Tallantyre, London, England, assignors to Gas Light & Coke Co., London.

1,465,886—Gathering and Delivering Apparatus for Molten Glass. A. C. Wilcox, Bridgeport, Ohio.

1,465,907 — Process of Producing Cement and Byproducts. F. W. Huber, Riverside, Calif., assignor, by mesne assignments, to Western Precipitation Co.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

a scrubber in which the scrubbing liquid is a solution of calcium acetate and acetic acid in water held at about its boiling temperature. The concentration of acetic acid in the scrubber liquid should be about the same as the concentration of the acetic acid distillate being scrubbed, and the liquid should be maintained at or near its boiling temperature to prevent absorption of acetic acid in the scrubbing liquid. The scrubbing liquid absorbs hydrochloric acid from the distillate, forming calcium chloride and acetic acid by reaction with the calcium acetate content of the scrubbing liquid. When the scrubbing liquid becomes ineffective or exhausted, it is added to a batch of calcium acetate and hydrochloric acid in the still, and a new solution of calcium acetate and acetic acid is supplied to the scrubber.

By distilling under vacuum, 80 per cent or more of the acetic acid content of a batch may be distilled in the form of an acetic acid solution of from 50 to 60 per cent strength and the yield is 90 per cent or better. This modification is covered by Patent 1,463,209, issue July 31, 1923, to John E. Haggenmacher, of Cleveland, and also assigned to the Grasselli Chemical Co.

Dehydrating Gypsum

In the dehydration or calcination of gypsum, it has heretofore been a common practice to first break up the rock gypsum and then heat the small particles by means of an open fire, so as to drive out or evaporate the moisture content. This process is wasteful and also quite expensive. It necessitates the employment of skilled and experienced help to carefully watch and examine the material at intervals to see that the required degree of heat is at all times applied and to prevent burning, which would result in imperfect calcination. Also by such heating process, small particles of gypsum are carried off by the escaping steam. This loss is about 20 per cent.

Francis B. Stuart and Charles A. Rivers, of El Paso, Tex., have found that, contrary to common belief, gypsum can be dehydrated and calcined by the use of steam. The gypsum, preferably in rock form, is placed in steel cars which are run into cylinders having a diameter of about 6 ft. After bolting on the cylinder head, steam is let into the cylinder until a pressure of approximately 150 lb. per sq.in. is registered. Steam is maintained at this pressure for a period of approximately four hours, the length of time depending largely upon the physical structure of the gypsum to be calcined. At the expiration of this period the steam supply is shut off and after the pressure within the cylinder has considerably reduced, the remainder of the steam is blown off. Upon the removal of the car from the cylinder it will be found that the gypsum has been uniformly dehydrated or relieved of its water content, and it is now ready to be crushed and pulverized. For this purpose, pulverizing machines, such as are generally employed, may be used. The material in this form is commercially known as plaster of paris and is mixed with other substances in the manufacture of hollow tile and other products in which gypsum is a primary constituent. It will be apparent that by means of the steam process above described, a considerable saving in the consumption of fuel may be realized over the old fire process. Further, it is only necessary to employ a single fireman to attend to the series of boilers and all danger of the gypsum being over- or under-heated is precluded. (1,463,913; Aug. 7, 1923.)

Important Articles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

WATER GAS PLANT TESTED BY BRITISH RESEARCH BOARD. C. H. S. Tupholme. A condensed review of the British Fuel Research Board's report upon the effect of depth of fuel in a generator. *Gas Age-Record*, Aug. 18, 1923, pp. 185-190.

NEW TESTING METHODS FOR CASTING. FIRST PART. E. Ronceray. A paper translated from the French in which transverse and shearing tests are recommended and tension and shock tests condemned. *Iron Age*, Aug. 16, 1923, pp. 393-396.

THE ROLE OF CHEMISTRY IN SEMI-STEEL. J. E. Bock. Chemical control of both raw material and finished castings necessary to obtain a satisfactory product. *Iron Age*, Aug. 16, 1923, pp. 397-398.

MCMILLAN DEFIBERIZATION PROCESS OF WOOD. Description with cuts of a process developed for removing the fiber from solid wood in line with the length of same. *Paper Trade Journal*, Aug. 16, 1923, pp. 43-45.

THE CANADIAN PULP AND PAPER INDUSTRY AND ITS RAW MATERIAL. Edward Beck. Statistics on production and reserve supplies of various pulpwoods as presented before the British Empire Forestry Conference on Aug. 10. *Pulp and Paper Magazine*, Aug. 16, 1923, pp. 813-815.

THE ACTUAL STATUS OF SULPHURIC ACID MANUFACTURE IN THE UNITED STATES. J. Vaverka. A review of contemporary American literature on this subject. *L'Industrie Chimique*, July, 1923, pp. 304-5.

TESTING THE STRENGTH OF PULPS. Sindall and Bacon. A contribution toward standardizing the methods now existing, showing how varying treatment in mill is likely to change resulting characteristics. *Paper Trade Journal*, Aug. 23, 1923, pp. 47-49.

TRAINING TECHNICAL PAPER MEN. C. E. Libby. A detailed description of the course offered at New York State College of Forestry, said to afford opportunity for practical experience in paper mills. Paper, Aug. 8, 1923, pp. 7-9.

WHAT THE BUREAU OF STANDARDS IS DOING TO HELP YOU IMPROVE YOUR WARE. Anon. Ceramic ware manufacturers as a whole do not appreciate excellent efforts made by bureau to promote progress in ceramic ware production. *Ceramic Industry*, August, 1923, pp. 128-129.

ONE HUNDRED MILLION FACE BRICK ANNUALLY. Anon. The story of the development of the Canton Brick Co.'s plants, telling how that company is planning to reach the 100,000,000 mark in 1924. *Brick & Clay Record*, Aug. 21, 1923, pp. 253-257.

FURNACES FOR MELTING GLASS. Digest of a paper by Dr. H. Maurach. Report of a German investigation of fuel required, rate of melting, port velocities of air and gas, volume of regenerators, etc. *Fuel & Furnaces*, August, 1923, pp. 233-236.

Decolorizing Sulphur Chloride

Crude sulphur chloride as ordinarily obtained is a dark brown or black product which contains impurities—for example, iron and coloring agents—that are objectionable. According to Joseph V. Meigs, of Montclair, N. J., such materials as infusorial earth, china clay, pumice, etc., are capable of occluding the impurities and coloring matter when added to the sulphur chloride in amounts of about 3 to 5 per cent. For example, 1,000 lb. of crude sulphur monochloride may be treated with 3 per cent crude calcium carbonate, the mixture agitated thoroughly for about 5 minutes and subsequently allowed to settle. The supernatant liquor is then filtered in any suitable manner, preferably with the aid of a filter press. The filtrate is of a light lemon or straw color and is then in a suitable condition for sale.

It is advantageous to use as an occluding or decolorizing agent one which is at the same time an anti-acid so as to effect the neutralization of free acid in the chloride of sulphur. This anti-acid decolorizing material may comprise the oxides, hydrated oxides and salts of the alkali or alkaline earth or earth metals. It is of course understood that such anti-acid materials must be in such a form that they will not interact with sulphur monochloride. Calcium carbonate is an example of a material which acts at the same time as a decolorizing and anti-acid material. (1,464,137; assigned to New Jersey Testing Laboratories; Aug. 7, 1923.)

Benzoic Acid From Benzyl Chloride

In the earlier patents 939,584, 939,940 and 939,941 Edwin O. Barstow, of Midland, Mich., described a method of making benzoic acid which consisted in agitating one part of benzyl chloride with three parts of water to form an emulsion, then running into a solution made by dissolving three and one-half parts of bleaching powder in twenty parts of water, and thereupon adding one-third part of slaked lime. Upon heating and stirring this mixture, calcium benzoate is formed, the operation being carried on in a common cement-lined retort provided with a reflux condenser, an agitator, and direct steam and water connections for regulating the temperature, which was maintained at about 95 deg. C. It was necessary to spray water over the cover of the retort when the reaction became too

vigorous; otherwise the mixture would boil and froth to such an extent as to overflow the vessel and clog the condenser. Under the circumstances stated, it takes from one-half to three-quarters of an hour to run the charge into the reaction vessel, if such boiling over or frothing is to be avoided. By conducting the reaction in a vessel capable of withstanding high pressure which is sealed before the reaction temperature is reached, the time is reduced to 3 or 4 minutes and a better yield of calcium benzoate results. Furthermore, the tendency for the mixture in the reaction vessel to foam unduly is practically entirely overcome. (1,463,190; assigned to Dow Chemical Co., July 31, 1923.)

Phosphorus Oxychloride

Ferric phosphate, compressed in the form of pellets, is introduced into a tube or other suitable reaction vessel made, for example, of vitreosil (silica), and heated to a temperature between 325 and 450 deg. C. A stream of phosgene is then passed through the tube. There results a practically theoretical transformation of ferric phosphate into phosphorus oxychloride and ferric chloride. As one of the products of the reaction is in the gaseous state and the other in the liquid state, they flow away in opposite directions. (1,462,732; Roland L. Andreau, assignor to E. I. du Pont de Nemours & Co.; July 24, 1923.)

Men in the Profession

Dr. THOMAS ADDISON has retired, at his own request, as Pacific coast manager of the General Electric Co., and will be succeeded by J. A. Cranston, formerly Northwestern manager. Dr. Addison has been with the company 33 years, and held his present position since 1892.

HOWARD BENNETTE will assume his duties as secretary of the Western Petroleum Refiners Association, Tulsa, Okla., Sept. 1, to which office he recently was appointed. Mr. Bennette will succeed John D. Reynolds, resigned, in this capacity.

Dr. THEOBOLD BENTZEN, a European scientist, is now chief of the laboratory and research department of the Whiting-Plover Paper Co., Stevens Point, Wis.

GRAHAM BRIGHT, formerly general engineer in charge of the coal and metal mining activities of the Westinghouse Electric & Manufacturing Co., has joined the firm of Howard N. Eavenson & Associates.

JOHN F. CUNNINGHAM, JR., has been appointed assistant manager of the production department of the Schenectady works of the General Electric Co.

F. S. EARLE, formerly associated with the Central Aguirre Sugar Co. of Porto Rico, has accepted a position as agriculturist with the General Sugar Co. which is managing the sugar estate interests in Cuba of the National City Bank of New York.

E. H. FITCH has been elected president of the Republic Rubber Co., Youngstown, Ohio, to succeed C. H. Booth, resigned. Mr. Fitch heretofore has been vice-president of the corporation.

R. A. GRIFFITHS, vice-president of the Sinclair Oil & Gas Co., New York, has been elected president of the company to succeed J. V. McMahan, resigned.

J. L. HEID formerly with the Color Laboratory of the U. S. Department of Agriculture, has been appointed as assistant chemical engineer in the helium purification plant at the Naval Air Station, Lakehurst, N. J.

Dr. M. E. HOLMES, who resigned as chemical director of the National Lime Association, has accepted the position of development engineer in charge of research of the U. S. Gypsum Co. at 205 W. Monroe St., Chicago, Ill.

J. V. MCMAHAN has resigned as president of the Sinclair Oil & Gas Co.

H. C. PARMELEE, editor of *Chem. & Met.*, has returned to the office after an extended absence.

D. A. POLHEMUS has been appointed assistant to the president of the Pittsburgh Crucible Steel Co., Pittsburgh, succeeding R. W. Light, recently promoted to assistant works manager at the company's plant in Midland, Pa.

J. LEONARD REPLOGLE has resigned as chairman of the executive committee and president of the Vanadium Corporation of America, New York City, on account of ill health. He will continue, however, as a director of the corporation. L. G. Baker, vice-president, will act as president pending the election of a successor.

Obituary

FREDERICK N. BEEGLE of Beaver Falls, Pa., died on Aug. 17, at the Beaver Valley General Hospital, New Brighton, Pa., following a few days' illness, aged 60 years. He was president of the Standard Gauge Steel Co., Beaver Falls, and the Beaver County Clay Co. of the same city, as well as the Union Drawn Steel Co. He is survived by his wife and one son.

Calendar

AMERICAN BAKERS' ASSOCIATION, twenty-sixth annual convention, French Lick, Ind., Sept. 9 to 16.

AMERICAN CHEMICAL SOCIETY, fall meeting, Milwaukee, Wis., Sept. 10 to 14.

AMERICAN ELECTROCHEMICAL SOCIETY, forty-fourth meeting, Dayton, Ohio, Sept. 27 to 29.

AMERICAN GAS ASSOCIATION, annual convention, Atlantic City, Oct. 15 to 20.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, winter meeting, Washington, D. C., Dec. 5 to 8.

AMERICAN MANAGEMENT ASSOCIATION, Hotel Astor, New York, Oct. 29-31.

AMERICAN MINING CONGRESS, Milwaukee, Wis., Sept. 24 to 27.

AMERICAN SOCIETY FOR STEEL TREATING AND INTERNATIONAL STEEL EXPOSITION, Motor Square Garden, Pittsburgh, Pa., Oct. 8 to 13.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, Dec. 3 to 6.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, annual convention, New York City, Dec. 3 to 5.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS, convention and exposition, Buffalo, N. Y., Sept. 24 to 28.

INSTITUTE OF METALS, autumn meeting, Manchester, England, Sept. 10 to 13.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATION ENGINEERS, fourteenth annual convention, Memphis, Tenn., Dec. 12 to 16.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES (NINTH), New York, Sept. 17 to 22.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING, Grand Central Palace, New York, Dec. 3 to 8.

NATIONAL SAFETY COUNCIL, twelfth annual safety convention, Statler Hotel, Buffalo, Oct. 1 to 5.

New Publications

NEW BUREAU OF MINES PUBLICATIONS: Tech. Paper 315, Comparative Test of By-product Coke and Other Fuels for House-Heating Boilers, by Henry Kreisinger, John Blizard, H. W. Jarrett and J. J. McKitterick; Tech. Paper 321, Anhydrous Aluminum Chloride, by Oliver C. Ralston; Tech. Paper 328, The Motor Gasoline Surveys of 1920 and 1921 (a sequel to Bulletin 191), by N. A. C. Smith; Tech. Paper 334, Mine Rescue Standards, a tentative study, prepared by a committee appointed at the International Mine-Rescue Standardization Conference, September, 1921.

NEW U. S. GEOLOGICAL SURVEY PUBLICATIONS: Mineral Resources of the United States in 1922 (Preliminary Summary), introduction by G. F. Loughlin, statistics assembled by Martha B. Clark, from data furnished by specialists of the Division of Mineral Resources, published Aug. 15, 1922; Bull. 750-A, Ilsemanite at Ouray, Utah, by Frank L. Hess; I: 3, Bismuth, Selenium and Tellurium in 1922, by Victor C. Heikes (Mineral Resources of the United States, 1922, Part I), published July 16, 1923; I: 4, Lead in 1922, by C. E. Siebenthal and A. Stoll (Mineral Resources of the U. S., 1922, Part I), published July 17, 1923; II: 3, Asphalt and Related Bitumens in 1922, by K. W. Cottrell (Mineral Resources of the U. S., 1922, Part II), published July 19, 1923.

THE SCIENTIFIC AND INDUSTRIAL RESEARCH COUNCIL OF ALBERTA has published Report 8, which is the third annual report.

THE INSTITUTE OF SCIENCE AND INDUSTRY, Melbourne, Australia, has issued Bulletin 24, on "The Production of Liquid Fuels From Oil Shale and Coal in Australia," by R. E. Thwaites.

THE IMPERIAL MINERAL RESOURCES BUREAU, London, England, has issued pamphlets on "Tin" and "Coal, Coke and Byproducts," which give statistics from 1919 to 1921.

FOREST PRODUCTS LABORATORY, Madison, Wis., has issued a program outlining the major lines of work on which the laboratory will be engaged during the fiscal year July, 1923, to July, 1924. Forestry officials, association secretaries, editors and others concerned with problems of wood utilization are requested to familiarize themselves with this program.

Industry and Trade

Current News and Market Developments

Summary of the Week

Production of coal-tar dyes in Germany in July amounted to 9,032,286 lb.

Cost of producing casein in the Argentine is lower than in this country according to an investigation made by the Tariff Commission.

Financial reports of large companies operating in that field indicate improvement in the fertilizer industry.

Prospects for best Chemical Exposition ever as plans for the big event are finally completed.

Domestic output of crude petroleum attained new high record of 2,104,742 bbl. daily during July.

American Chemical Society's arrangements for fall meeting at Milwaukee Sept. 10 to 15, include trip to Madison, usual sectional meetings, etc.

Frank B. Gorin appointed head of heavy chemicals division, Division of Chemistry, Bureau of Foreign and Domestic Commerce.

Bleaching powder has been under selling pressure for some weeks and it still is a buyers' market with no stability to prices.

Secretary Mellon issues standards for newsprint which define papers to be placed on free list.

Chemical Prices in August Receded to Lowest Level of the Year

Declines Checked in Latter Half of Month, With Slight Recovery in Weighted Index

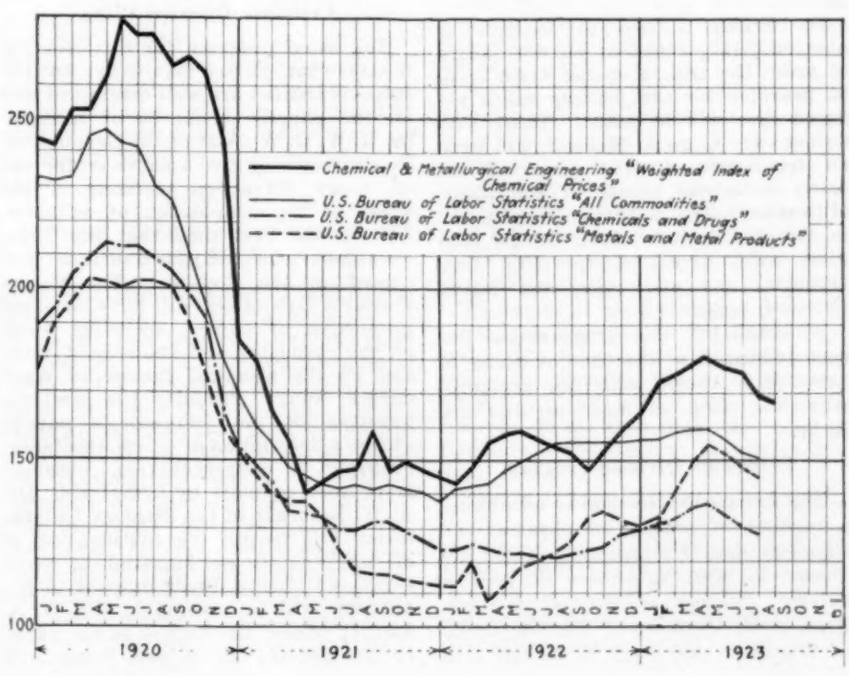
THE declining tendency of values for chemicals and allied products was in evidence in the early part of August, with the result that average prices for that month were lower than for any of the preceding months of the year. In the latter part of the period quotations were on a fairly stable basis, with selling pressure confined to comparatively few items. Some commodities showed an upward trend under increased consuming demand. Inquiry in general was broader and encouraged the belief that buying for fall requirements soon would be a market factor.

Chem. & Met.'s weighted index represents average prices for the month as 167.86, which compares with 169.91 for July and 176.45 for June. The weighted index for the first week of August was 166.70, which figure suffers in comparison with the average for the month, and thus emphasizes the firmer position of prices later in the period.

The action of the market reflected an improved call for supplies, a better inquiry for forward positions and a general indication that buying would assume larger proportions. On the other hand, many chemicals were at price levels which did not admit of further reductions and sellers realized that price cutting was of little, if any, assistance in bringing buyers into the market. Cables from foreign markets also had a strengthening effect on many selections, as shipment prices were sometimes higher than the levels at which spot goods were selling and holders of stocks were not so eager to unload at prices which were below replacement costs. The importance of competition from foreign-made chemicals is apparent from import figures just made public, which show that imports for the first 6 months of the year were approximately 40 per cent higher than for the corresponding period of 1922.

The Bureau of Labor in its review of wholesale prices for July states that the decline in the general level which began in May continued throughout July.

Measured by the Bureau of Labor's weighted index number, the average for 404 commodities was placed at 151, which represents a drop of 1⅓ per cent from the June figure and a drop of 5 per cent from the April average. The weighted index number for chemicals and drugs was 128 in July and 131 in June. Metals and metal products stood at 145 in July and 148 in June.



All Roads Lead to Milwaukee Sept. 10 for Fall Meeting A. C. S.

Sectional Meetings and Social Events—Trip to Madison, Friday, Sept. 14—Plans Nearly Complete—Final Program Coming Soon

THOSE who are planning to attend the fall meeting of the A.C.S. to be held at Milwaukee during the week of Sept. 10 are assured technical sessions of unusual interest as well as the usual banquets, trips, etc., which contribute to make the week enjoyable. The headquarters for the society are to be at the Hotel Pfister on Sept. 10 and other days after 6 p.m. During the morning and afternoon, beginning on Sept. 11, headquarters will be at the Municipal Auditorium.

All members of the society, with their guests, will be entertained by the Milwaukee Section at a dinner to be given in Marquette Gymnasium on Sept. 11. On the same day, in the morning, addresses of welcome by Clare H. Hall, chairman of the Milwaukee Section; Daniel W. Hoan, Mayor of Milwaukee; Emmanuel Philipp, president of the Milwaukee Association of Commerce, and by the Rev. Albert C. Fox, president of Marquette University. President E. C. Franklin will respond for the society.

Addresses of general interest also scheduled for Tuesday include one by Charles F. Burgess on "Marketing Chemical Discoveries," and one by Dean Arthur I. Kendall of the Medical School of Northwestern University on "Bacteria and the Chemist."

On Wednesday evening Mrs. Thomas G. Winter, president of the General Federation of Women's Clubs, will speak on "The Relation of Women to Scientific Development in Our National Life." President Franklin will also speak on "Systems of Acids, Bases and Salts."

On Friday a trip to Madison is planned. If a sufficient number desire to make the trip, a special train is to be provided for the journey and a reduced fare will be made. Those who do not care to go to Madison will have an opportunity to visit some of the many industrial plants in and about Milwaukee. The industries represented in this list include steel, leather and glue, dairy products, dyestuffs, food products, gas and coke, and heavy chemical apparatus.

Although the final program has not been published at the time of going to press, it is known with fair certainty what the plans of most sections are to be.

Petroleum Division Program

The Petroleum Division is scheduling a number of papers on physical and chemical data fundamental to the industry as well as others of greater current interest to the oil refiners. Prof. J. H. Mathews of the University of Wisconsin and Prof. E. H. Leslie of the University of Michigan are offering discussions of heats of vaporization and of vapor pressures. Two papers on lubrication oils will be given by Prof. E. H. Leslie and D. P. Barnard of M.I.T. R. E. Wilson of the Standard Oil Co. of Indiana has two papers on the properties and analysis of paraffine. The estimating of gasoline volatility will be discussed by W. A. Gruse of the Mellon Institute.

Rubber Problems Slated

Of the eight papers on the program of the Rubber Division, three deal with the chemical action of accelerators in the vulcanization of rubber. One deals with laboratory apparatus, one with the effects of different factory practice on the quality of finished goods and one on the difference between sprayed rubber and smoked sheets. The influence of certain compounding ingredients will be discussed; likewise the plasticity of vulcanized rubber.

Concerning Sewage Disposal

The Division of Water, Sewage and Sanitation will hold a symposium on activated sludge. Milwaukee has one of the largest plants ever erected for the disposal of sludge by the activated sludge process. Dr. Edward Bartow of the University of Iowa will lead a discussion dealing with the wastes from packing houses. Dr. John Arthur Wilson of the Sewerage Commission of the city of Milwaukee will demonstrate by means of slides, some of the recent scientific developments in this process.

Cellulose Division Plans

The usual program for this meeting is somewhat shorter than usual, but the subjects treated are well diversified and all the papers should be of interest. Dr. R. W. G. Wyckoff of the Geophysical Laboratory will give a paper on the use of X-ray diffraction methods in the study of the composition of cellulose. This is the first time that this comparatively new subject has been discussed in the division. The Forest Products Laboratory will have its usual proportion of papers, including work on the chemistry and analysis of wood and on the chemical change in wood during decay. Probably the most interesting of the laboratory's papers will be a description of a new substance, probably a polysaccharide, obtained from wood cellulose by hydrolysis. Dr. A. W. Schorger of the Burgess Laboratories will discuss the continuation of his work on the geltinazation of wood. Subjects of more direct interest to the industry will be covered by Dr. G. A. Richter of the Brown Co. in his paper on the penetration of acid liquor into wood chips, by J. O. Small of the Hercules Powder Co. on the viscosity of cotton cellulose and by Prof. Ralph H. McKee of Columbia University on a process for extracting resinous wood chips with sulphur dioxide for the removal of the resin previous to cooking by the sulphite process. The symposium on waste sulphite liquor is expected to bring out some interesting discussion. Professor McKee especially has promised to describe a method for the profitable and complete utilization of sulphite liquor.

Details of the meetings of other sections are not available at present. The Division on the Chemistry of Medicinal Products is known to be planning a symposium on the subject of glandular compounds. To take care of the large number of papers presented, the Physical Section is to hold a special session on Tuesday afternoon, when six papers on important subjects are to be presented. During the same afternoon the Organic Division is staging a special session at which five papers will be presented. At this time Benjamin T. Brooks will discuss "Petroleum as a Chemical Raw Material."

Are You Going or Coming?

In other words, are you going to Milwaukee to attend the A.C.S. fall convention during the week of Sept. 10 and coming to New York to visit the Chemical Exposition during the week of Sept. 17? Both promise to be noteworthy events and fully worth while. Here are the plans for the convention, giving assurance of an interesting and profitable week.

As for the exposition, it is conceived along broader lines, will include more exhibits and is better organized than ever before. An opportunity to keep track of progress in every branch of chemical engineering and as such altogether too good to miss!

T.A.P.P.I. Program Announced for Chemical Exposition

The Technical Association of the Pulp and Paper Industry, which will hold its annual fall meeting again this year in conjunction with the Chemical Exposition at the Grand Central Palace, New York, on Sept. 20 at 2:30 p.m., has announced six speakers for the occasion. T. L. Crossley, of the *Pulp and Paper Magazine of Canada*, will talk on "The Attitude of Men to Educational Opportunities to Study in Pulp and Paper Mills"; Hubb Bell, United States Testing Co., "The Standardization of Paper by Test"; N. W. Sultzer, Research Corporation, "Application of the Cottrell Electrical Precipitator to the Pulp and Paper Industry"; J. H. MacMahon, Mathieson Alkali Works, "Preparation of Bleaching Liquors From Liquid Chlorine"; R. F. Bacon, Texas Gulf Sulphur Co., "The Mining of Sulphur"; James G. Vail, Philadelphia Quartz Co., "Silicate of Soda in the Paper Mill."

United States Fails to Hold Japanese Chemical Trade

In the heavy chemicals and dyestuffs trade of Japan the United States has not held the position it gained during the war, with the single exception of the trade in sulphate of ammonia. For other heavy chemicals and dyestuffs Japan is now turning to England and Germany, principally because better prices can be had from those countries, according to a report made by E. R. Dickover, U. S. consul at Kobe.

The Japanese market for heavy chemicals and dyestuffs improved considerably during 1922, since the large surplus stocks of industrial chemicals, carried over from the post-war speculative period, were gradually becoming depleted, while the comparative prosperity of the cotton, silk and wool spinning and weaving industries maintained the demand for dyestuffs.

The imports of chemical fertilizers, such as crude nitrate of soda and crude sulphate of ammonia, were large during 1922, owing to the prosperous year in the agricultural districts. Chile, of course, originally supplied all of the crude nitrate of soda imported, although some was transshipped to Kobe from Vladivostock and other places where it had been held in bond. However, over 90 per cent of the crude sulphate of ammonia imported at Kobe in 1922 was supplied by the United States, and it appears that American manufacturers have definitely captured this market, as the proportion of the total imports supplied by the United States has been growing larger each year.

Increased Imports of Soda Ash and Phenol

The importation of soda ash in 1922 was more than double that of 1921, due to a slight recovery in the glass and soap industries. About 25 per cent of the imports were from South Africa (natural Magadi soda), while the remainder came from England. The United States was entirely out of the local market, and no American soda ash was shipped to Kobe in 1922.

The importation of phenol into Kobe and Osaka was steady and comparatively large during 1922, although the lack of the speculative element in the purchase of this commodity prevented any wild pyramiding of orders, as so often happens in Japan. The United States has lost its share of this trade, having shipped only 2 per cent of the total imports in 1922, as compared with over 50 per cent in 1920. Great Britain is now supplying the bulk of the carbolic acid used in Japan.

Germany Regaining Dyestuffs Trade

The trade in aniline dyes was prosperous during 1922. Germany, as was to be expected, has recaptured the bulk of the trade, supplying 86 per cent of the aniline dyes imported into Kobe, while the United States sent only 8 per cent, whereas in 1920 the United States furnished 65 per cent and Germany 16 per cent of the total imports.

American artificial indigo has not been so completely overshadowed by German supplies, but even in this case Germany furnished over 50 per cent of the 1922 imports into the Kobe consular district, the remainder coming from the United States and Great Britain. Naturally, the exchange situation has assisted Germany to a very great extent, while the substitution of a high ad valorem duty for the former low specific duty on aniline dyes coming into Japan has intensified the difference in price and rendered it more difficult to market American dyestuffs here. It is expected, however, that these handicaps to the importation of American dyestuffs will be partly removed in the course of time.

Canada Seeks to Develop Artificial Silk Industry

The Canadian Government has made a move toward the encouragement of the artificial silk industry by placing a duty on imported artificial silk fabrics of 17.5 per cent under the British preference, and 30.5 per cent under intermediate and general tariff.

The viscose process would appear to be the best for Canada on account of its comparative cheapness and the plentiful supply of cellulose material—some of which in the form of sulphite pulp is shipped to silk plants in France and Italy.

There are twenty-four Canadian companies situated in every part of Canada producing sulphite pulp. Caustic soda is produced in eastern Canada at the plants of the Canadian Salt Co. of Windsor, Ont. Carbon bisulphide is not manufactured in Canada, but with an abundance of willow and birch for the making of charcoal, cheap electric power and easy access to a plentiful and cheap supply of almost pure sulphur, conditions are propitious for the production of carbon bisulphide at reasonable cost. As for the sulphite pulp, there are nearly 700,000 tons of it manufactured in the Dominion of Canada yearly.

Seeking to Improve Courses of Chemistry in High Schools

The College Entrance Examination Board has appointed a commission to revise the definition of the requirement in chemistry. The commission desires to have the benefit of all opinion adverse or otherwise on the present syllabus. All those who wish to criticise either the chemistry syllabus itself or the examinations set in accordance therewith or who may have constructive comments looking towards improvement in the requirement are requested to send such information to the chairman of the Revision Commission, Prof. Percy T. Walden, Department of Chemistry, Yale University, New Haven, Conn.

News Notes

Chemicals in commerce at the exposition are to be discussed in the student course in a general manner by E. V. Peters, New Jersey Zinc Co. Williams Haynes, *Drug and Chemical Markets*, New York, will discuss "Chemical Market Prices." H. M. Batters, *Chem. & Met.*, is to talk on "Some Problems in Marketing Chemicals."

The Belgo Paper Co. at Shawinigan Falls is making arrangements to place another paper machine in operation. The work on the general extension of the plant is now more than 60 per cent complete. The new paper machine will not be used until December.

The rubber mixing machine, invented by C. C. Moshier of the East Iron & Machine Co., Lima, Ohio, was inspected recently by representatives of several Akron companies. This machine, it is claimed, may revolutionize crude rubber mixing methods.

The Bush English China Co., which has been recently organized to manufacture china tableware, has made an advantageous arrangement with the town of Port Hope, Ont. It has secured, under a 99-year lease, lands and buildings with wharves and deep water docks running alongside the plant. The company has a fixed taxation for 10 years, and has made the necessary ararrangements for power and other facilities.

The L. S. Finch Chemical Co. has taken over the plant of the Guasti-Finch Chemical Co. at Los Angeles, Calif. Organic acids are being manufactured, including propionic, buteric, valeric and acetic. At present production on propionic acid exceeds 10,000 lb. per month.

The West Leechburg Steel Co., Leechburg, Pa., is completing the construction of a new addition, representing an investment of close to $2,000,000 in buildings and machinery, and plans to place the works in service early in September. It is expected to give employment to about 500 operatives and additions will be made immediately in the working force, increasing the quota to 1,400 men. The company is said to have orders on hand to insure maximum production at the new plant for some time to come.

Quebec is at present enjoying one of the largest movements of asbestos fiber and sand ever exported on ocean-going steamers, there having been between 9,000 and 10,000 tons of this commodity cleared from the port on various steamers since the opening of navigation.

The Belamose Corporation has recently made a considerable purchase of factory property at Hartford, Conn. Artificial silk is to be the product manufactured. The location of the plant is largely due to the absence of all mineral matter in the water available at this site. Capitalization is $1,000,000.

Washington News

Rubber Experts Sail to Philippines

A staff of government experts will sail from Seattle on Sept. 11 for the Philippines to study the possibilities of rubber production in the islands, the Commerce Department announces. The survey to be made is in connection with the investigations being conducted by the department to locate areas for American controlled rubber production to combat foreign monopolies of the supply of the raw material.

The party to make the investigation in the Philippine Islands consists of C. F. Vance, of Troy, Ohio, special agent of the department, in charge; A. H. Muzzal, of Carpentia, Calif.; John P. Bushnell, of Washington, D. C., and Marl Baldwin, of the Bureau of Soils of the Agricultural Department.

German Dye Production for July

The production of coal-tar dyes in Germany for the month of July totaled 9,032,286 lb., according to a report received by the Commerce Department from Trade Commissioner Jones at Paris. The report listed the output for the month as follows:

Group Classification	Lb.
I Alizarin red	366,855
II Indigo paste	27,087
III Vat colors, except indanthrene blue G. C. D.	236,677
IV Indanthrene blue G. C. D.	...
V Alizarin colors other than red	140,516
VI Direct colors for cotton	2,627,293
VII Direct colors for diazotisation	337,682
VIII Acid colors for wool	1,487,790
IX Chrome colors for wool	720,219
X Basic colors	325,653
XI Sulphur colors	2,522,978
XII Lake colors	239,536
Total	9,032,286

F.T.C. Complaint Against Shellac Company

The Federal Trade Commission has issued a complaint against H. O. Greenbaum, trading as the Technical Color & Chemical Works and Victory Shellac Works. The concern is a manufacturer of paints, varnishes, shellacs and substitutes for shellac, and has its general offices in New York City.

In the citation the respondent is charged with manufacturing and selling a product composed of a small percentage of pure shellac gum and in some instances no shellac gum whatever, labeled and branded as "Red Devil Shellac" and "Victory White Shellac," representing on the labels and containers of such product that the contents are guaranteed to be pure shellac dissolved in denatured alcohol, without indicating in any way whatever on such labels that the product contained any gum other than pure shellac. This, the commission alleges, is an unfair method of competition, and deceives the general public.

F. B. Gorin Heads Heavy Chemicals Division

Will Work Under Concannon in Bureau of Foreign and Domestic Commerce

The appointment of Frank B. Gorin as chief of the heavy chemicals section of the Chemical Division, Bureau of Foreign and Domestic Commerce, has been announced by C. C. Concannon, chief of the division, effective immediately.

This announcement shows development of the plans by which it is hoped ultimately to increase the personnel of the Chemical Division so that a specialist will be in charge of each of four sections which it is planned to create in the organization: heavy chemicals, dyes and coal-tar products, medicinals and pharmaceutical products, and paints, varnishes, oils and gums.

Mr. Gorin is a native of Missouri. Specializing in chemistry, he attended the Lane Technical College in Chicago, and the George Washington University, in Washington, D. C.

As a chemist for the Western Electric Co., he spent several years in its Hawthorne works. Later he became chief chemist for the Stewart Manufacturing Corporation, in Chicago.

Mr. Gorin served in France throughout the war as an officer in the Chemical Warfare branch of the army.

He has been a resident of Washington for the past 3 years, and up to the time of his resignation from the Chemical Warfare Service last December was located in the War Department as chief of the industrial relations division. In this capacity he spent the greater part of a year making an official survey of the facilities of the American dye and chemical industry. In the course of this work, and particularly in his visits to seventy-odd plants through the country, Mr. Gorin built up a wide acquaintance.

During the past 8 months he has maintained an office in Washington and operated as a special sales representative for E. I. du Pont de Nemours & Co. as well as a number of other American chemical manufacturers, and established export markets for a group of rare organic chemicals.

Standards for Newsprint Defined by Mellon

The tariff admits standard newsprint into the country free of duty. That fact has given rise to much speculation as to what might be considered "standard." As a result the matter has been receiving considerable attention by the Treasury for several months past. Regulations have just been issued by Secretary Mellon stating that standard newsprint is defined as: "paper consisting of mechanically ground wood pulp and chemical wood pulp or sulphite containing not in excess of 30 per cent of sulphite, and varying in weight not more than 10 per cent from 32 lb. to each 500 sheets 24x36 in.

"This definition is applicable to newsprint paper without regard to the color thereof."

The new regulation is much broader than the definition drawn up by the Tariff Commission. It allows a variation of 10 per cent in weight, where the commission's defiinition allowed only 5 per cent, and the new rule permits standard newsprint to contain up to 30 per cent of sulphite, where the commission's finding limited sulphite to 20 per cent.

Investigation is understood to have disclosed that the newspapers used any grade of paper which would stand the presses, and would accept consignments which varied considerably from the contract requirements if it would serve the purposes for which it was ordered. For this reason the Treasury attempted to draft a definition which would permit of free entry to imports of paper intended for the printing of newspapers, making the limits of the definition as broad as possible.

Approve New Italian Customs Tariff

The Italian customs tariff which was put into effect on July 1, 1921, subject to subsequent approval by Parliament, was approved, with a number of modifications, by a royal decree dated July 11, 1923, and effective on the day after its publication in the *Gazzetta Ufficiale* for July 26.

Among chemical items on which changes have been made are:

	Former Rate Lire per 100 Kilos	New Rate Lire per 100 Kilos
Sodium carbonate	1.20	2.40
Barium chloride	8	10
Lithopone	..	16
Calcium cyanamide	4	3
Ammonium nitrate (impure)	..	1
Formaldehyde, solution up to 40 per cent	30	18
Formaldehyde, other	60	36
Sulphur black	120	96

Record Output of Crude Oil in July

During July production of crude petroleum in the United States, as measured by the quantity transported from producing properties, attained the new high record of 2,104,742 bbl. a day, according to data reported to the Geological Survey down to Aug. 27. Daily average imports were 222,419 bbl. and daily average exports of crude oil were 49,800 bbl. Deliveries to domestic consumers increased to the new high record of 1,974,032 bbl. a day. The new supply was greater than the demand by 9,403,000 bbl., which was added to storage.

The production of crude petroleum during the first seven months of 1923 was 403,000,000 bbl., as contrasted with less than 318,000,000 bbl. during the similar period of 1922.

Production Costs of Casein Lower in Argentina Than in United States

Tariff Commission Figures Offer Interesting Comparisons—Domestic Production Increased in First Quarter of Year

THE public hearing on the application for a reduction in import duty on casein held before the Tariff Commission Aug. 13 and 14 disclosed that the investigation into costs of production had established the fact that Argentina produced this material at lower cost than was the case in this country. Cost figures are reduced to weighted averages, but are incomplete inasmuch as they do not include prices for skimmed milk, which is the important raw material in casein manufacture. Costs for the latter were not included, because of difficulty found in determining fair average values in the two countries.

Production Data

It was stated that detailed data in regard to the cost of producing casein during 1922 were secured from eighteen out of a total of seventy-four American producers. Those eighteen producers made 4,985,182 lb. out of a total of 6,927,000 lb., or 72 per cent. The remaining manufacturers do not keep books in such a manner that it was possible for them to supply data on costs of manufacture.

The most important item in these cost accounts is skimmed milk, which, in the weighted average, is nearly one-half of the total. The most difficult problem in this cost investigation is to ascertain and determine the fair and proper value to be charged for skimmed milk in these accounts. No conclusion as to the proper method of ascertaining the value of skimmed milk for the purpose of the pending proceeding has yet been reached. It is expected that this question will be discussed during the arguments on Sept. 25. Pending a decision on this question the cost tables including skimmed milk can not be prepared.

Exclusive of the cost of skimmed milk, but including all other charges, the weighted average cost of domestic production is $0.0547 per pound laid down in New York; 42½ per cent of the production is below this average cost. The 75 per cent bulk line cost is $0.0610 and the 85 per cent bulk line cost is $0.802. These costs are given in the form of weighted averages and as bulk line costs, as information only and not as implying that a conclusion has been reached that the phrase "costs of production" in section 315 should be interpreted to mean a weighted average, or bulk line costs. Rail freight rates have been taken from California to New York. Rates from California through the Panama Canal are lower and are about 50 cents per hundred, but such rates are subject to fluctuation.

Argentina, the chief foreign nation producing casein, was visited by two representatives of the commission in order to secure costs of production. In making casein in Argentina no attempt is made to recover sugar of milk from the whey. In the case of companies buying whole milk to make butter and casein, it was stated that 6 centavos per liter ($0.9611 per 100 lb.) was the minimum price at which they could purchase whole milk.

In Argentina the casein factories are located from 100 to 200 miles from Buenos Aires. It was found that cartage and rail freight from factory to ship averaged about 0.8 cent per lb. in 1922. Ocean freight from Buenos Aires to New York was 0.3 cent per lb., and export charges, insurance, consular fees and brokerage an additional 0.3 cent, making a total transportation cost from factory in Argentina to New York of 1.4 cents per lb., or $1.40 per 100 lb. The Argentine casein then must pay domestic transportation in costs from New York to the inland consuming centers. Freight rates from New York to Kalamazoo, the largest consuming center, are $0.48 per 100 lb., or a total of $1.88 per 100 lb. from Buenos Aires.

DETAILED COMPARISON OF COST OF PRODUCING CASEIN IN UNITED STATES AND IN ARGENTINA (WEIGHTED AVERAGES)

	—Dollars per Lb.— Domestic	Argentina
Direct labor cost	0.0132	0.0137
Container cost	0.0012	0.0023
Factory expense	0.0202	0.0176
General expense	0.0084	0.0076
Freight rate to New York	0.0098	0.0066
Selling expense	0.0019	0.0065
Cost at New York plus selling expense, without duty and without skim milk costs	0.0547	0.0543

Uses of Casein

Probably 75 per cent or more of the domestic casein consumption is used in the manufacture of coated paper, and consequently affects the paper, printing, lithographing, electrotyping and publishing industries. The coated paper manufacturers have stated that for every cent per pound duty on casein the cost of coated paper is increased 0.1 cent per pound. Probably the next most important use is as an adhesive in the manufacture of plywood veneer products, such as doors, desks, chests and airplane propellers. This use was developed during the war as a result of search for a waterproof adhesive of great strength. Casein is the best material for this purpose.

Casein which has been precipitated with rennet is used in the manufacture of galalith and aladdinite. These are trade names for hardened casein, from which a wide variety of articles, such as combs, brush backs, umbrella handles, buttons and cigarette holders, are made. They compete with celluloid, pyroxylin and synthetic phenolic resin products, amber, coral, hard rubber, bone and tortoise shell. Relatively small amounts of casein are consumed for this purpose in the United States. This industry is better developed abroad.

Other less important uses are in the manufacture of wall paper, as an ingredient of spray insecticides and waterproof paints, as a diabetic food, and, in a minor way, in a score of other industries.

Domestic Production

The casein production for the year 1922 was 6,927,000 lb. This amount was produced by seventy-four factories. The production for the first quarter of 1923, as reported by ninety-two factories, was 2,037,000 lb., or an average of 22,000 lb. per factory, while production for the same quarter of 1922 of sixty-four factories was 1,166,000 lb., an average of 18,000 lb. per factory. This shows that there was a large increase in the production of casein, and in the amount produced per factory, as well as nearly 50 per cent increase in the factories which have begun making casein since the beginning of the year 1922.

In 1917 the Department of Agriculture conducted a survey of the casein industry in which it was reported that the sales of casein by thirty dealers and manufacturers was 12,390,000 lb., of which 86.3 per cent was sold to paper manufacturers; 6.2 per cent to glue and adhesive manufacturers, and the remainder to miscellaneous consumers. The proportion used in making adhesives has probably increased since 1917.

Bauxite Shipments From France

Directly or through intermediaries German interests have been buying low-grade bauxite ores in France for some months. Formerly the traffic with Germany since the armistice was through the port of Rotterdam and the shipments confined to red bauxite of an analysis which showed around 60 per cent of pure alumina and from 2 to 3 per cent silica. British and United States and Canada buyers and refiners have been using these same ores for years past shipped from the southern French ports of Saint Raphael, Toulon, Marseilles and Port de Bouc. It is only recently that the white bauxites with high silica content have been demanded, presumably by reason of the price in the first instance and secondly because of some practical process for treating the ore of this grade, a process which for the moment at least is seemingly unknown in France. A recent shipment of white bauxite was shipped to Antwerp to be reshipped to Russia for German account. Meantime a way has apparently been found in Europe to make use of low-grade bauxite ore for the extraction of its alumina.

Sweden Discusses Resources at Congress of Engineers

A national congress of engineers, working in fifteen sections, opened Aug. 8 at Gothenburg. In an introductory discourse on the conditions of Swedish industrial life, the chief engineer, M. Svedberg, pointed out that apart from cultivated land Sweden's natural resources consisted of forests, ore deposits and water power. As regards ore the prospects were very bright, an undiminished export of iron ore being possible for hundreds of years to come. The recently found copper and sulphur deposits promise to render Sweden to a large extent independent of imports. The total water power available in Sweden was calculated at 6,750,000 turbine hp., out of which about 1,300,000 was already exploited and a further 2,200,000 could be exploited during the next 40 years. The speaker emphasized the fact that even if this further exploitation of water power were completed at once it would still be necessary to import about 1,500,000 tons of coal and 90,000 tons of mineral oil. Finally he said that the most urgent needs of Swedish industry were peace in the labor world, reduced taxes and lower railway freight rates.

Alsatian Potash Industry

Potash production of the French mines in the Nonnebruck district of Alsace show a steady increase during the past 4 years of French operation.
Insert Six Point

	Metric Tons
1919	592,365
1920	1,222,370
1921	903,134
1922	1,326,727

Shipments to the United States during the first 4 months of 1923 were valued at 2,069,000 francs, practically the same as for a like period in 1922, but double that of 1921.

The fact that the majority of the states have doubled the legal minimum of potash for soil fertilization tends to further American trade, through the Potash Importing Co. of America, in whose foundation the German Kali Syndikat had a hand, has largely increased its imports. The prosperity is however shared by the shippers of Alsace.

Canadian Cement Production Gains

Total sales of cement in Canada during 1922 reached 6,943,972 bbl., exceeding the previous year's total sales by 1,191,087 bbl., it is shown in a report issued by the Dominion Bureau of Statistics. The total mill output amounted to 6,447,696. bbl., a decrease of 1,960 bbl. from the 1921 total. No puzzolan cement was produced during the year.

Ten plants operated during the year and twelve were idle. The daily capacity of the active plants was 35,338 bbl. Ontario and Quebec were the principal producing provinces.

Trade Notes

The output of chrome ore in Rhodesia for July was 7,578 tons.

E. H. Fitch has been elected president of the Republic Rubber Co. of Youngstown, Ohio, to succeed C. H. Booth.

The plant of the American Cotton Oil Co. at Memphis, Tenn., has been sold to the Dixie Cotton Oil Co. of Little Rock, Ark.

The new zinc oxide plant of the Anaconda Copper Co., at Akron, Ohio, will be enlarged to double its present capacity. The plant is running 24 hours a day and is turning out 15 tons of zinc oxide daily.

The Welch, Holme & Clark Co. has sent announcements to the trade, advising of revisions in jobbing price schedules for caustic soda and soda ash for delivery in the metropolitan district.

Philipp Bauer of Philipp Bauer & Co. of Hamburg, Germany, has become associated with J. F. Wischusen in the management of the Superfos Co., Inc.

A report from London states that Professor Green, research director of the British Dyestuffs Corp., has resigned.

A "comprehensive inquiry" into the cost of producing sugar beets in the United States has been ordered by the Tariff Commission. The survey will be merely for gathering facts, the commission announced, and the investigators will not be expected to make recommendations.

Evans McCarty, president of the Titanium Pigments Co. and a member of the executive board of the National Lead Co., sailed from New York last week for a trip to Europe.

The "Save the Surface" golfers, of the Paint, Oil and Varnish Club of New York, will hold a meeting on September 11 at the Upper-Montclair Country Club.

D. W. Jayne, of Jayne & Sidebottom, Inc., returned last week from a vacation trip to the Maine woods.

The Federal Trade Commission has issued a cease and desist order against Dings & Schuster of Long Island City. The order prohibits the use of the words "White Shellac" or "Shellac" as a label or brand for varnish not composed wholly of shellac gum cut in alcohol.

New Courses in Metallurgy at Carnegie Tech

New courses in metallurgy and allied subjects have recently been established at the Carnegie Institute of Technology in Pittsburgh, Pa. The increasing demand for men so trained, particularly in the Pittsburgh steel district, has been the determining factor in causing the Institute to take this step. The courses will take up particularly the practical side of the industry.

French Chemical Industry Is Quiet

Midsummer stagnation has brought about a reduced volume of business in all chemical production lines in France. The traditional dead season is this year more marked than at any time since the war. Manufacturers are filling orders on hand and producing very little for stock, while orders for future delivery are slow in forthcoming.

Small Demand for Acids

Above all are demands rare for sulphuric acid. Nitric acid is in small demand and prices high for reason of foreign exchange rates. Muriatic acid is in more regular demand, but stocks are limited.

The secondary industries likewise show but slight activity. Buyers are few and only pressing needs are being covered. The season's business just closed, notably as to sulphur, sodium and bichromates, was satisfactory. The two American sulphur companies at Marseilles and Sicilian distributors alike have had an unprecedented demand for sulphur solutions for vine spraying, with the result that the wine crop of the present year is the largest for a decade, having met with practically no crop losses in any section of the south.

The glass-making industry is handling but few orders, production being slowed down as is customary during the hot weather. The production of sulphite of soda is curtailed as usual during this epoch.

Shortage in Dyestuffs

With dyestuffs there is a shortage of certain coal-tar derivatives, possibly due to the complications on the Rhine. Colors for paint manufacture are low in stock, but the demand being temporarily slight, the trade holds its own fate in its hands pending a revival. Bleaching products are in a similar situation, but the cotton and linen mills and the conditioning plants of Alsace and the Vosges and those of the Tourscing-Lille district apparently have ample supplies in hand or contracted for to carry them through the autumn months.

Glues and gelatines in their raw form are distinctly short on the market, thus making their manipulation and consequent distribution costly in their manufactured forms.

Synthetic pharmaceutical and perfumery components are stationary and there is a well-defined tendency to develop the natural perfumery industry of Grasse and south France to the detriment of the "universalization" of artificially produced oils and perfumes.

Talcs and tartrates are much in demand for export to the United States; takings of the latter for the first 2 months of 1923 were to the value of 6,729,000 francs while "other chemical products," as is the French export classification, reached the figure of 8,514,000 francs.

Arthur E. Rice Dead

Arthur E. Rice, president of the Pennsylvania Salt Manufacturing Co., died on Sunday, Aug. 26, at the Canyon Hotel, Yellowstone National Park. Mr. Rice accompanied by his sons, Everett I. and Gordon H., left Philadelphia on Aug. 7, on a vacation trip to western points. He was 52 years old and had been connected with the Pennsylvania Salt Manufacturing Company from his youth, having entered the employ of the company in 1888. He advanced steadily in positions of importance and early in 1921 was selected as president of the company, succeeding Joseph Moore, Jr. Funeral services were held at his late home in Philadelphia on Friday. Dr. George Fales Baker is acting as temporary president of the company.

Carbon Black Production Increased in 1922

The quantity of carbon black produced from natural gas in the United States in 1922 amounted to 67,795,000 lb., over 13 per cent more than in 1921, according to a statement issued by the Department of the Interior through the Geological Survey. The production and value of carbon black, by states, in 1922 as compared with 1921 are shown in the following table, compiled by H. Backus from reports of twenty-six producers. Montana, Oklahoma, Pennsylvania and Wyoming are grouped together so as not to make public the output of individual companies. In 1922, as in 1921, Louisiana and West Virginia produced more than 90 per cent of the total output. Louisiana maintained first place and increased its lead over West Virginia, owing to developments in the Monroe field.

CARBON BLACK PRODUCED FROM NATURAL GAS IN 1921-1922

State	Number of Producers Reporting	Quantity (Lb.)	Value at Plant Total	Average per Lb. (Cents)
1922				
Kentucky	3	4,306,875	$416,549	9.7
Louisiana	14	41,966,856	3,564,393	8.5
Montana	1			
Oklahoma	1	1,425,917	124,100	8.7
Pennsylvania	1			
Wyoming	1			
West Virginia	11	20,095,481	1,714,576	8.5
Total	26	67,795,129	5,819,618	8.6
1921				
Kentucky	2	2,697,075	215,822	8.0
Louisiana	11	31,003,615	2,949,428	9.5
Montana	1			
Oklahoma	1	573,225	38,707	6.8
Pennsylvania	1			
Wyoming	2	419,400	37,521	8.9
West Virginia	12	25,073,000	2,204,400	8.8
Total	23	59,766,315	5,445,878	9.1

Increased demand for carbon black during the later half of the year, especially by the rubber industry for use in making tires, required practically all the product of the year and, in addition, between 12 and 15 million pounds that had been held in storage. The increased demand was reflected by a rise in spot prices. The reported average price realized for the year at the plants was 8.6c. a pound.

Increased Sale of Bromine in 1922

Bromine sold in 1922 was 41 per cent greater in quantity but 13 per cent less in value than in 1921. The average price decreased 38 per cent. A large part of the output is not sold as bromine, but in the form of potassium and sodium bromides and other salts. The figures given in the following table include the bromine content of these salts. The values given in the table are reported to the Geological Survey by the producers and represent averages for the year f.o.b. at the plants.

BROMINE SOLD IN THE UNITED STATES

Year	Lb	Value Total	Value Average
1917	895,499	$492,703	$0.55
1918	1,727,156	970,099	0.56
1919	1,854,971	1,234,969	0.67
1920	1,160,584	745,381	0.64
1921	711,953	172,759	0.24
1922	1,005,174	150,668	0.15

Bromine had not been imported into the United States for several years prior to 1921, when imports of 300 lb., valued at $84, were reported. For 1922 the imports reported were 1,094 lb., valued at $339. The exports of bromine are not separately reported by the Bureau of Foreign and Domestic Commerce.

International Standardization Sought in Swiss Conference

A conference of the secretaries of national industrial standardizing bodies was held in Switzerland, July 3 to 7. Thirteen countries were represented, including all of the more important industrial nations of Europe and America. The sessions were held in Zurich and in Baden.

A leading topic discussed by the conference was the interchange of information among the various national bodies during the development of the work in the different countries. At the first conference held in London 2 years ago, arrangements were made for the systematic interchange of completed work and to some extent of information on work in progress. Experience had shown such an early interchange to be extremely important for the work within the different countries from the national viewpoint alone and quite irrespective of the question of international standardization.

While it was not possible to overcome all the difficulties existing by virtue of the important industrial considerations involved, very substantial progress was made. It is believed that the steps taken will lead immediately to a substantially increased amount of interchange of information during the earlier stages of standardization work and that the way has been paved for a much more extensive interchange in the future.

Provision was made for continuing the work of the conference on the many administrative problems of common interest, through a loose-knit continuing organization. An example of such work planned by the conference is the translation of technical terms of special importance or difficulty in standardization work. There will gradually be built up such a vocabulary of technical terms, mainly in English, French and German, but supplemented as far as may be feasible and necessary by the corresponding terms in other languages. Another example is the work undertaken by the conference on the classification and nomenclature of standards.

Hardness Symposium to Be Held at Pittsburgh

At Pittsburgh during the convention and international steel exposition of the American Society for Steel Treating to be held Oct. 8 to 12, the hardness committee of the National Research Council will again hold a symposium similar to the one this committee held during the A.S.S.T. convention at Detroit last year. The preparation of the program is under the direction of Major A. E. Bellis, president, Bellis Heat Treating Co., New Haven, Conn. He has been successful in arranging a very interesting list of papers. The authors who will contribute to this important session will be: A. V. DeForest, American Chain Co., Bridgeport, Conn.; A. L. Davis, Scovill Maufacturing Co., Waterbury, Conn.; H. M. German, Henry Disston & Sons Co., Philadelphia, Pa.

The hardness testing committee of the National Research Council also plans to have a hardness testing machine from England on hand for examination and discussion.

Financial Notes

A special meeting of the stockholders of the Standard Oil Co. of New York will be held on Sept. 12, for the purpose of voting on proposition to increase the capital stock from $225,000,000 consisting of 9,000,000 shares of $25 par value, to $235,000,000, to consist of 9,400,000 shares of $25 par value.

Sidney Blumenthal Co., Inc.., reports net profits of $895,939 for the 6 months ended June 30. After taking care of preferred dividends, this is equivalent to $3.70 a share on 218,212 shares of no par common stock outstanding.

The Keystone Tire & Rubber Co. operated at a net loss of $182,170 for the first half of the current year.

Swift & Co. have declared a regular quarterly dividend of $2 per share, payable Oct. 1 to stock of record Sept. 10.

The Diamond Match Co. will retire its $6,000,000 issue of 15-year 7½ per cent debenture bonds on Nov. 1, without the sale of additional common stock as had been planned.

The International Cotton Mills has declared a quarterly dividend of 1¾ per cent on the preferred stock.

Facts and Figures That Influence Trade in Chemical Products

Market Conditions

Current Prices
Imports and Exports
The Trend of Business

Small Lot Buying Features Current Trading in Chemical Products

Larger Volume of Business but Buyers Cover Only Nearby Requirements—Outlook Regarded as Promising

REPORTS on activity in the present market vary, but in general it is stated that small lot orders have increased in number and the total of such sales represents progress as practically all sellers report a larger volume of business for August than was found in the preceding month. While some interest has been shown in contracts covering distant deliveries, the majority of buyers have been satisfied to take care of present needs only. They evidently wish to obtain a better idea of conditions which will obtain in future months and do not feel the necessity for placing contracts as long as prices do not appear to be in danger of upward revisions.

The weighted index number for the week shows a slight appreciation, although some of the minor chemicals were actually lower in price than a week ago. It is worthy of note that basic chemicals are holding steady with very few exceptions and with inquiry becoming more general, the outlook is regarded as favorable for more active trading, which in itself would have a stabilizing, if not a strengthening, effect on market values.

Imported chemicals are irregular as higher prices rule for some selections abroad and others are offered freely at unchanged prices and even at reductions from recently prevailing prices. Copper sulphate for shipment from European points is decidedly easy and surplus stocks are still seeking an outlet in this country at a time when consumers are not very anxious to take on commitments. Caustic potash also is offered freely from abroad with an easy undertone to values.

Another quiet week was reported for calcium arsenate and the brief period of activity which featured the market of 2 weeks ago, seems to have satisfied the wants of southern consumers and appears to have been the last call from the cotton growers. Arsenic has been irregular on spot due to shading on the part of a few holders but this was not general and on forward positions the market retains a firm appearance with low priced bids having failed to find sellers.

Bleaching powder, which has been one of the weak items of the market, failed to improve during the week and this condition is expected to continue until surplus stocks have been taken from the market. The weakness of spot material is arousing interest in prices for future deliveries and consumers are asking how far this price-cutting will extend.

Acids

Acetic Acid—Withdrawals against contracts are reported to be increasing but the week in general was described as quiet and new business is not coming to hand in a large way. The market retains a steady position as far as prices are concerned. Quotations are: \$3.38@\$3.63 per 100 lb. for 28 per cent; \$6.78@\$7.13 per 100 lb. for 56 per cent; \$9.58@\$9.83 per 100 lb. for 80 per cent; \$12@\$12.78 per 100 lb. for glacial.

Domestic Prussiate of Soda Lower — Imported Grades Also Easier — Arsenic Irregular on Spot, Firm on Shipment — Calcium Arsenate Quiet — Tartaric Acid Quiet and Easy — Foreign Copper Sulphate Lower — Alkalis Steady.

Butyric Acid—Sellers report an increased call for supplies in the past month, although round lot orders have not been numerous. Producers have held prices on fairly steady level and competition from foreign makers has not been keen. Asking prices are on a basis of \$1.10@\$1.20 per lb. for absolute, 80@90c. per lb. for 90 per cent, and 70@80c. per lb. for 60 per cent.

Citric Acid—Imported grades show an easy appearance and offerings were not difficult to find at 49c. per lb. Imports during the week were large. Shipments from abroad were quoted at 49c. per lb. and some importers were said to be willing to try out bids fractionally under that level. Domestic makers are finding a fair call for stocks at unchanged prices of 49@50c. per lb.

Formic Acid—There is practically no inquiry for domestic acid and the latter is said to be nominal in price. Imported grades are in good supply with a fairly steady demand for moderate sized lots. Prices quoted range from 12c. to 14c. per. lb. depending on quantity, grade, and seller.

Oxalic Acid—There is an easy tone to this market and while importers quote 12¼c. per lb. there are reports that spot goods have sold under 12c. per lb. and different sales have been made at the 12c. level. Domestic grades are quoted at 12c. per lb. at works with only moderate interest on the part of buyers.

Phosphoric Acid—Sellers have been prominent and some pressure is said to have been used to attract buyers. There is a lack of large lot buying but some improvement in jobbing business. U.S.P. is offered at 15½@16c. per lb. Technical 50 per cent is held at 7½@8c. per lb.

Tannic Acid—Some sellers say that prominent consuming trades have been unusually dull through the summer months and that demand can not help but show improvement from now on. Buyers are reported to be carrying very limited stocks and this is regarded as another promising sign. Values are well maintained with U.S.P. firmly held at 80c. per lb. and upwards. Technical was offered at 40@43c. per lb.

Tartaric Acid—Domestic grades are holding at 36c. per lb. with reports that sales have gone through at that level. Foreign makes are offering considerable competition and the position of markets abroad is being watched closely as reports are heard that demand in foreign countries has slowed up and that offerings for shipment to this country may increase. Holdings of foreign material on spot were available at 33c. per lb. and even at that price there was no activity.

Potashes

Bichromate of Potash—There is not sufficient interest among buyers to hold the market in a firm position. Stocks are said to be moderate but sellers are eager to book orders and values are in favor of buyers. The open quotation for spot and prompt deliveries is 10c. per lb., but sales have been made on firm bids under that figure and it is stated that shading is still a feature.

Caustic Potash—Spot holdings of imported caustic are said to be moderate but lower prices for shipment have made holders eager to dispose of stocks on hand and there was no difficulty in doing 7¼c. per lb. for spot material. For prompt and nearby shipment from abroad the open quotation was 7c. per lb. Demand was light and in some quarters it was felt that shipment prices might work still lower. Domestic caustic is steady at 9c. per lb., at works, and upwards according to quantity

Carbonate of Potash—Cable advices indicated firm markets abroad for car-

bonate and bicarbonate of potash. The latter was quoted at 9@9½c. per lb. for U.S.P. Stocks of carbonate on spot, however, are free and shipment prices failed to reflect on spot values. Calcined 80-85 per cent was available at 6@6½c. per lb. and 96-98 per cent at 6¾@7c. per lb. Hydrated was quoted at 6¾@7c. per lb.

Permanganate of Potash—Imported still shows a range according to seller but there seemed to be more offered at 17c. per lb. than in the past 2 weeks. Asking prices ranged up to 18c. per lb. Shipment prices from foreign points continue to hold above the spot level and are receiving no attention. Domestic permanganate is offered at 17c. per lb., at works, and is said to be moving freely.

Prussiate of Potash—Red prussiate has been weak for some time and private terms have entered into transactions. Holders have been willing to stimulate trading by cutting prices and this condition still exists. Open quotations are given at 62c. per lb., but this has been shaded materially and better than 60c. per lb. can be done on both spot and shipment. Yellow prussiate also is easy and subject to concessions. For shipment as low as 29c. per lb. has been quoted and spot is quoted at 33c. per lb. but is easy at that price.

Sodas

Soda Ash—In addition to revisions in jobbing prices for delivery to points neighboring to New York as reported last week, prices also have been revised on such lots for delivery in the metropolitan section. The latter schedule quotes ash at $2.10 per 100 lb. for 5 bags and upwards and $2.25 per 100 lb. for less than 5 bags. Contract prices are steady at $1.38 per 100 lb. for car lots, at works, in bulk, $1.45 per 100 lb. in bags, and $1.69 per 100 lb. in bbl. Dense ash is quoted at $1.42 in bulk, $1.51 in bags, and $1.75 in bbl.

Bichromate of Soda—Asking prices of first hands are holding at 7½@8c. per lb. for quantity lots. Resale lots also are quoted at the same levels. A quiet week was reported but improvement is looked for in the present month. Export buying has been of minor importance recently but is also expected to show gains in the near future. The fact that production has been held at low levels through the slow buying period is taken to mean that stocks are not heavy and bears out reports that prices will stiffen when demand increases.

Cyanide of Soda—The market is featured by a range in asking prices which is accounted for variations in grade with some difference according to seller. Imported cyanide is offered on spot at 19c. per lb. and prices range up to 22½c. per lb.

Caustic Soda—Leading producers are offering prompt shipment from works at $3.16 per 100 lb. and this price also held good on shipments covering periods ahead. Ground and flake were quoted at $3.60 per 100 lb. at works. The usual premiums are asked for less car lots. Jobbing prices for caustic for delivery at metropolitan points are $3.80 per 100 lb. for 5 drums and up and $3.95 per 100 lb. for less than 5 drums.

Nitrate of Soda—Reports of financial conditions of prominent fertilizer companies show that recent operations have shown decided improvement. This is regarded as favoring a good season for fertilizer materials, including nitrate of soda. Recent buying of nitrate has been light but this is regarded as a temporary condition. Prices for spot material are easy, following the lack of buying, but holders are not forcing matters and are maintaining their quotation at $2.45 per 100 lb.

Nitrite of Soda—Sales of imported are reported at 7½c. per lb. and asking prices range up to 8c. per lb. with quality a factor in determining values. Domestic nitrite is steady at 7½c. per lb. at works for round lots. Inquiry for domestic was increasing and some large buyers were reported to be negotiating for supplies in the latter part of the week.

Prussiate of Soda—Domestic makers announced that they were prepared to take on orders for September delivery at 14c. per lb., which represents a decline of ½c. per lb. from the August quotation. Imported prussiate also was easier and spot material was offered at 13¾c. per lb.

Miscellaneous Chemicals

Arsenic—The spot market was irregular. Some holders were eager to push sales and as low as 9½c. per lb. could be done in some quarters. Other sellers were firm at 10c. per lb. and upwards. Shipments were steady. Bids were submitted at 9½c. per lb. for Japanese but were not accepted and 10@10½c. per lb. represent the asking prices. Domestic makers are reserved on forward positions but are quoting 10@10½c. per lb.

Bleaching Powder — Surplus stocks are still heavy in some quarters and present trading is largely a matter of private terms as far as prices are concerned. There has been no general change in the prices quoted and 1¾c. per lb. for carlots in large drums at works is still the open quotation. Actual business, however, is around the 1½c. per lb. level and goods have changed hands below that figure. Liquid chlorine also has suffered from selling pressure and many holders of stocks are said to be open to bids under 4½c. per lb. for round lots.

Calcium Arsenate—There was no improvement in demand during the week and no large buying is now expected. The market is largely nominal as far as prices are concerned with 13@14c. per lb. representing general asking prices. Considerable stocks are reported to be unsold and this causes belief that private terms could be worked on round lot business.

Hydrated Lime—Chemical lime was reported steady at $10.50@$12.50 per ton, in bags, f.o.b. works, the price varying according to the grade and seller. The customary premium obtains for lime in cooperage.

Carbon Tetrachloride—Leading producers quote the market unchanged at 9c. per lb., in drums, carload lot basis, prompt shipment. On standard brands the undertone remains steady.

Tin Oxide—There was a firmer market for the metal, but prices for the oxide did not change. The quotation held at 45c. per lb. Demand was restricted almost entirely to small lots.

Salammoniac—Offerings were plentiful and with no change in the situation abroad prices on the imported material were considered barely steady. There were sellers at 5¾@6c. per lb. white granular, in casks, immediate and nearby delivery. Domestic producers reported the market unchanged on the basis of 7½c. per lb. for the white, in bbl.

Fusel Oil—Arrivals were noted from abroad, but most of the shipments were small and the market underwent little if any change. Prices were wholly nominal.

Barium Chloride — Prices heard ranged from $82@$85 per ton, immediate shipment. On forward business the inside figure might have been shaded to the extent of $2 per ton.

Copper Sulphate — There was an easier tone to the market for foreign makes. Spot holdings were offered at 4⅝c. per lb. and shipments were quoted at 4½c. per lb. The latter price applied to late shipments as well as to prompt. In English markets high grade material is quoted at £26 per ton. Domestic grades were quoted at 5.10@5.25c. per lb.

Alcohol

A steady undertone features the market for denatured alcohol. Demand was fair, considering the season of the year. On the special, No. 1 formula, 190 proof, producers quoted from 38@40c. per gal., in drums, the inside figure obtaining on carload lots. Formula No. 1, completely denatured, 188 proof, ranged in price from 39@41c. per gal., in drums, and 45@47c. per gal., in bbl. U.S.P. ethyl alcohol, 190 proof, was unchanged at $4.75 per gal., cooperage basis. There was little or no change in the market for methanol, first-hands quoting from $1.18@$1.20 per gal., in bbl.

"Chem. & Met." Weighted Index of Chemical Prices

Base = for 1913-14

This week	169.78
Last week	169.14
Sept., 1922	148.00
Sept., 1921	147.00
Sept., 1920	267.00
Sept., 1919	272.00
Sept., 1918	278.00

The advance in the week's index number, amounting to 64 points, was occasioned by another uplift in crude cottonseed oil.

Coal-Tar Products

Improvement in Byproduct Coke Situation—Naphthalene Offered Freely—Spot Prices Irregular

BUSINESS in the market for coal-tar products continued along quiet lines and some irregularity was reported in spot prices. However, no open price changes were put through by first hands. On contract business there was a possibility of shading prices for phenol and naphthalene, but producers were not anxious to meet the views of prospective buyers on benzene. Solvent naphtha was firmly maintained under limited offerings. Attention of traders has been attracted by reports from coke-producing sections of plans to increase the output to meet the threatening shortage in the supply of anthracite for domestic fuel purposes. The market for byproduct coke has steadied, and this is regarded as a favorable development from the standpoint of future supplies of crudes. The gasoline situation remains unsettled. Distribution of motor fuel during the month of August was large and surplus stocks have been reduced. Export inquiry for coal-tar products was inactive. Foreign cables showed little change. Advices from Manchester revealed a better tone to the market for creosote, but unsettlement prevailed in most of the other coal-tar products.

Aniline Oil and Salt—There were sellers of aniline oil for immediate shipment from works at 16c. per lb., in drums, carload lots, indicating that the market underwent no change. Demand was routine only. In salt the first-hand quotation stood at 23c. per lb.

Anthracene—On the 80 per cent material small lots are bringing from 80@82c. per lb., immediate delivery. On contract 75c. is named as the nominal trading basis, with domestic producers well sold up.

Benzaldehyde—The recent reduction in the F.F.C. material brought out some buying interest. Competition has increased of late, and this was given as the reason for the recent cut in prices. Up to the close producers offered F.F.C. banzaldehyde for immediate shipment at $1.60 per lb. The U.S.P. grade was barely steady at $1.50 per lb. On the technical grade the market held at 75c. per lb.

Benzene—The market for benzene was a mixed-up affair. Inquiry for pure benzene was in evidence, but buyers' views were below the market and, so far as could be learned, no round-lot transactions were closed. The market for the 90 per cent material was unsettled and with no improvement in the motor fuel situation prices obtained remain unsatisfactory. Production of byproduct coke will be pushed this fall, as demand for a substitute for anthracite has already set in and, even should there be no strike, it is regarded as certain that prices for coal will be high enough to insure a steady movement of coke into the domestic trade. This, of course, will have some influence on the market for benzene. Export demand was dull. Producers quote 25c. per gal., tank cars, on the 90 per cent, and 27c. per gal., tank cars, on the pure, f.o.b. works. Scattered lots could have been picked up in the open market at concessions.

Creosote—The English market steadied on small offerings. In Manchester nominal quotations range from 8⅜@9¼d. per gal., bulk basis, immediate shipment.

Cresylic Acid—The market was unsettled, prices covering a wide range, depending upon the seller. On the 97 per cent grade prices heard ranged from 80@90c. per gal., immediate shipment. On contract the inside figure could have been shaded. Demand was slow.

Naphthalene—Quiet prevailed in the market and prices were irregular. Flake on spot was offered at 6¾@7c. per lb., round-lot basis, while on shipment the inside price could have been shaded without difficulty. Ball naphthalene on spot was nominal at 7@7¼c. per lb. Chips closed at 6c. asked. Crude was offered for shipment from the other side at 2¼@2½c. per lb., the price depending upon the quality. Several shipments came through from the other side last week.

Paranitraniline — The market was steady at 73@75c. per lb., the inside figure obtaining on round-lots, f.o.b. works. Second hands offered scattered lots at slight concessions.

Phenol—Trading has been inactive and little interest is reported in futures. U.S.P. phenol was offered by producers at 28@32c. per lb. On contract it was possible to shade the inside figure.

Pyridine — Offerings remain scanty and prices are little more than nominal. For spot goods the market stood around $4.75@$5 per gal. Prompt shipment from abroad could have been secured at $4.25 per gal.

Solvent Naphtha — Offerings were moderate because of the sold-up condition of producers and a firm undertone prevailed in all quarters. Water-white naphtha for shipment from works on contract held around 27c. per gal., tank car basis.

Canadian Flax Prospects Good

The Dominion Bureau of Statistics estimates the 1923 Canadian crop of flaxseed at 5,607,000 bu., which compares with 5,009,000 bu. a year ago. The area sown is placed at 630,172 acres, and the yield per acre at 8.9 bu.

High Prices Depress German Textile Industry

Conditions in the German textile industry are steadily growing worse, according to a report forwarded by Consul Louis G. Dreyfus, at Dresden. The textile business decrease, he says, has been in proportion to the diminishing public purchasing power, which is spreading gradually to wider circles. Many German buyers claim that they are not in a position to pay the high prices for textiles now demanded by manufacturers and wholesalers.

British American Nickel Co. Becomes Active

The second furnace has been blown in at the British American smelter at Sudbury, Ont. A third furnace is on the ground but has not yet been erected. Approximately 1,000 tons of ore is being treated daily at the smelter. With both furnaces operating at capacity, it is expected that it will be increased to such an extent that the monthly amount of ore treated will be close to 50,000 tons.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	64	66¼
Allied Chem. & Dye	67	68
Allied Chem. & Dye pfd.	108	*108
Am. Ag. Chem.	12	17
Am. Ag. Chem. pfd.	31	41
American Cotton Oil	7	7
American Cotton Oil pfd.	21½	23
American Cyanamid	*57	*59
Am. Drug Synd.	4⅛	4⅛
Am. Linseed Co.	19½	21
Am. Linseed pfd.	*38	40
Am. Smelting & Refining Co.	58⅜	60½
Am. Smelting & Refining pfd.	*96	97½
Archer-Daniels Mid. Co., w.i.	26	28
Archer-Daniels Mid. Co., pfd.	93	93
Atlas Powder	57	57½
Casein Co. of Am.	*62	*62
Certain-Teed Products	*26	30
Commercial Solvents "A"	*32	32
Corn Products	127½	128⅜
Corn Products pfd.	*120	*120
Davison Chem.	30½	52
Dow Chem. Co.	*45	*45
Du Pont de Nemours	124⅜	131
Du Pont de Nemours db.	84½	84½
Freeport-Texas Sulphur	12⅜	13
Glidden Co.	*8⅜	*8½
Grasselli Chem.	*132	*132
Grasselli Chem. pfd.	*105	*105
Hercules Powder	106	110
Hercules Powder pfd.	104	107
Heyden Chem.	*1⅞	*2
Int'l Ag. Chem. Co.	2⅜	3½
Int'l Ag. Chem. pfd.	8	11½
Int'l Nickel	13	13
Int'l Nickel pfd.	*79½	79½
Int'l Salt	*89½	*89½
Mathieson Alkali	43	46
Merck & Co.	*78	*78
National Lead	124½	130
National Lead pfd.	*112⅜	*113½
New Jersey Zinc	152	152
Parke, Davis & Co.	78½	*78½
Pennsylvania Salt	*81	*81
Procter & Gamble	128	*128
Sherwin-Williams	28⅜	28⅜
Sherwin-Williams pfd.	102	102
Tenn. Copper & Chem.	9½	9½
Texas Gulf Sulphur	58½	59⅜
Union Carbide	56½	56⅜
United Drug	79½	78½
United Dyewood	46	47
U. S. Industrial Alcohol	45⅜	55½
U. S. Industrial Alcohol pfd.	*100	*100
Va.-Car. Chem. Co.	8	12⅜
Va.-Car. Chem. pfd.	24⅜	34⅜

*Nominal. Other quotations based on last sale.

Vegetable Oils and Fats

Crude Cottonseed Advances—Linseed Lower—Active Call for Copra—Coconut and Corn Higher—Tallow Up

THE feature was the advance in cottonseed oil. The tight statistical position of old crop oil and the uplift in lard, the latter inspired by the recent developments in the European situation, caused shorts to cover. Fear as to the outcome of the next report on cotton also influenced traders. Crude corn oil and coconut oil moved upwards, while firmer prices prevailed on palm oils. Tallow advanced ¼c. during the past week on fairly active trading. Linseed oil went off, prices moving more in line with the market for seed. Crude menhaden oil sold at 40c. per gal., in tanks, f.o.b. factory.

Cottonseed Oil—The option market on the Produce Exchange passed through a rather exciting week. The better feeling in all of the edible fats, reflecting optimistic views on the German situation, sent lard prices sharply higher. This had an important influence on the oil situation. Packers inquired freely for immediate crude as well as bleachable oil. Shorts in September and October became frightened and the buying orders resulted in transactions in September refined at 10.90c. per lb., and October at 10.65c. per lb. Against the buying of nearby oil the speculative element sold the December and March options. Bleachable oil was in active demand, but sales were few because of the dearth in supplies. Late in the week 15 tanks of crude sold at 9¼c. per lb., immediate shipment from Texas, an advance of ¼c. for the week. September crude settled nominally at 8¾c., with October at 8¼c. Later positions were wholly nominal around 7¾c. per lb., buyers' tanks, f.o.b. mills, Texas common points. Numerous bids were around at 7¼c. for November forward. P.S.Y. on spot, in bbl., settled at 11¾@12c. per lb. Salad oil on spot closed at 12¾@13c., as to quantity and seller. The cotton situation was not considered so bad as a week ago. Rains fell in Texas. Private estimates on the crop ranged from 10,900,000 to 11,500,000 bales. Lard compound closed at 12¼c. Pure lard, Chicago, September option, 11.72c.

Linseed Oil—Prompt shipment oil closed 3c. lower. Early in the week there was some call for September oil, but as soon as this was satisfied the market went into another quiet period. The seed markets were irregular. Reports of frost in the northwest were not taken seriously. Several private wires received here late last week indicated that no serious damage resulted from the recent cold spell and the condition of the crop, taken as a whole, was good. Receipts of new crop seed were larger, but harvesting has not yet set in up north and the movement will not be heavy for another month. Argentina reported steady prices, the speculative element supporting the market. Competition for oil business was keen and prices varied considerably. Late in the week September oil was offered at 88c. per gal., in cooperage, carload basis, with October at 83c., November at 81c. and November-April at 80c. Several traders held out for 90c. on spot oil. Resale oil sold at 87c., September delivery. London cabled the market as 1s. lower, spot closing at 39s. 6d. per 112-lb., loose, ex mill. Linseed cake for export was firmer, spot closing at $35 per ton, with futures at $37 per ton, f.a.s. New York. Not much business was placed, but higher prices abroad steadied the market.

China Wood Oil — Quiet prevailed throughout the week and spot prices were barely steady, notwithstanding the steady tone of cable advices from China. Spot oil settled at 22@23c. per lb., in cooperage. On the coast there were offerings at 21½c. per lb., tank cars, October-November shipment.

Coconut Oil—Not much business went through, but prices were advanced on the strength in copra. It is reported that operators, who sold oil recently at 7½c., f.o.b. Pacific coast, are bidding for copra and find the market in a tight position. Ceylon type oil for shipment from the coast in sellers' tanks settled at 8c. asked, all positions. Last sales in New York went through at 8⅜c. per lb., sellers' tanks, but since then the asking price has been raised to 8½c. Copra closed at 4¾@5c. per lb., c.i.f. coast, an advance of ¼c.

Corn Oil — Demand improved and with cottonseed higher prices again moved upwards. Sales went through at 8½c. per lb., sellers' tanks, September shipment, f.o.b. point of production.

Olive Oil Foots—Scattered lots sold at 8⅝c. per lb. The market was steady at the close.

Palm Oils—Niger oil on spot sold at 6¾c. per lb. Demand was fair, but sellers' views were a little too high to permit of active trading. The strength in tallow steadied prices. Lagos for shipment closed at 7¼c., with Niger for shipment at 7c., c.i.f. New York.

Rapeseed Oil — October-December shipment from the other side sold at 72c. per gal., cooperage basis. Inquiry was good. On spot refined oil brought 77c. per gal.

Soya Bean Oil—Crude was offered at 9c. per lb., sellers' tanks, duty paid, prompt shipment from New York. Market dull.

Menhaden Oil—Reports on fishing were better. The fish are yielding from 4 to 6 gallons per 1,000. The sale of 4,000 bbl. of crude went through at 40c. per gal., f.o.b. factory, southern territory, an advance of 1c.

Tallow and Greases — Late in the week 60 drums of extra tallow sold at 7¼c. per lb., ex-plant, an advance of ¼c. Previous to this 500,000 lb. of extra sold at 7¼c., ex-plant. The market was firm at the close. Yellow grease was raised to 6⅞@6¾c. Oleo stearine closed firm at 11¼c. bid, with sellers at 11½c. per lb.

Miscellaneous Materials

Antimony—The market was quiet and prices were easier. Prompt shipment from China is offered at 5½c. per lb., c.i.f. New York. On spot there were sellers at 7½c., f.o.b. New York.

Casein — Imported material was offered freely at prices ranging from 13½@14½c. per lb., with domestic at 15@17c. per lb.

Chrome Ore—It was reported that some business was pending on Indian ore on the basis of $19.25 per ton, c.i.f. Baltimore. Rhodesian was nominally unchanged at $22@$23 per ton.

Glycerine — An easier feeling prevailed in some quarters. Business was confined mostly to small lots. Chemically pure was nominally unchanged at 17@17½c. per lb., in drums. Dynamite was offered in the middle-west at 15½c. per lb., with bids at 15⅜c. per lb. Soap-lye crude, basis 80 per cent, was offered at 11c. per lb., loose, f.o.b. shipping point. Saponification, basis 88 per cent, loose, closed at 12½c. per lb., f.o.b. shipping point.

Lithopone—With no change in basic materials the market for domestic lithopone was maintained on the carload basis of 7c. per lb., in bags.

Manganese—No sales were reported. On Indian or Brazilian ore importers quote 40c. per unit, c.i.f. Atlantic ports.

Naval Stores—In the absence of any important buying, either from domestic or foreign quarters, the market for spirits of turpentine closed barely steady at 95c. per gal., which price compares with 96c. per gal. a week ago. Southern markets were featureless. In rosins there was a fair movement of material against existing contracts, but new business proved disappointing. Quotations held on the basis of $5.75 per bbl. for the "B" grade.

Shellac—Spot offerings were freer, but with little change abroad the market here closed unchanged. T.N. on spot settled at 58c. per lb., while on ex-dock parcels 56c. was done.

Tin Oxide—The market ruled steady despite the inactive state of trade. American process, lead free, held at 8c. per lb.

Waxes—Crude African beeswax was available on spot at 21c. per lb., while on forward material asking prices ranged from 21½@22c. per lb. Brazilian crude settled at 26c. per lb. Candelilla wax was offered at 23c. per lb. There was an easier market in the higher grades of carnauba, the No. 1 selling at 38c. per lb.

White Lead—There was an advance in pig lead amounting to ¼c. per lb., but this failed to change the views of producers of lead pigments. The market for dry white lead, basic carbonate, settled at 9¼c. per lb., in casks. On the sulphate 8¾c. represented the market.

Imports at the Port of New York

August 24 to August 30

ACIDS—Boracic—250 bg., Leghorn, Pacific Coast Borax Co. **Citric**—600 bbl., Genoa, L'Appula Soc. An. **Formic**—281 demijohns, Rotterdam, R. W. Greeff & Co. **Tannic**—50 pkg., Hankow, Order. **Tartaric**—800 bbl., Barletta, Order.

ALCOHOL—150 bbl. denatured, Arecibo, C. L. Estevas.

ALBUMEN—896 cs. dried, Nanking, Order; 140 cs., Hankow, Order.

ALBUMEN—26 cs., Shanghai, Stein, Hall & Co., 42 cs., Shanghai, French, Kreme & Co.; 268 cs., Shanghai, Order.

ANTIMONY REGULUS—350 cs., Shanghai, Wah Chang Trading Corp., 1 lot, Havre, Order; 1,000 cs., Hankow, Order; 200 bbl. Havre, Heemsoth, Basse & Co.

AMMONIUM CARBONATE—10 csk., Liverpool, Brown Bros. & Co.

AMMONIUM PERCHLORATE—976 cs., Genoa, New York Trust Co.

ARSENIC—126 csk., Hamburg, Ore & Chemicals Corp.; 170 cs., Shanghai, Wah Chang Trading Corp.; 100 cs., Kobe, Busk & Daniels; 116 bbl., Tampico, American Smelting & Refining Co.; 1 bx., Canton, C. F. Smillie & Co.; 47 csk., Hamburg, Central Union Trust Co.

BARIUM CHLORIDE—42 csk., Hamburg, Meteor Products Co.

BRONZE COLOR—14 cs., Bremen, L. Uhlfelder Co.; 31 cs., Bremen, Baer Bros.

BARYTES—43 csk., Bremen, L. H. Butcher & Co.; 1,000 bg., Genoa, Bankers Trust Co.

BLEACHING POWDER—75 cs., Liverpool, H. Kohnstamm Co.

BORATE, LIME—6,476 bg., Mejillones, Pacific Coast Borax Co.

COPRA—300 bg., Port Antonio, Banana Sales Corp.

CASEIN—834 bg., Buenos Aires, T. M. Duché & Son.

CAMPHOR—20 cs., Shanghai, Wah Chang Trading Corp.

CHALK—25 csk., Bristol, H. J. Baker & Bros.; 500 tons (bulk), Dunkirk, J. W. Higman & Co.; 595 tons, Dunkirk, Taintor Trading Co.

CREAM TARTAR—50 csk., Hamburg, Guaranty Trust Co.

CHEMICALS—134 csk., Hamburg, Jungmann & Co.; 15 cs., Rotterdam, Roessler & Hasslacher Chemical Co.; 138 pkg., Rotterdam, Order; 52 csk., Hamburg, Chaplain & Bibbo; 100 bbl., Hamburg, A. Hurst & Co.; 50 bbl., Hamburg, Roessler & Hasslacher Chemical Co., 162 dr., Hamburg, A. Klipstein & Co.

CITRATE LIME—121 csk., Messina, C. Pfizer & Co.

CITRATE MAGNESIA—50 cs., Genoa, East River National Bank; 25 cs., Genoa, P. Pastene & Co.

COLORS—36 csk. earth, Bremen, Heller & Merz Co.; 25 csk., C. Hellmuth, Inc.; 8 csk. dry, Bremen, C. Helmuth; 1 csk. chrone, Bremen, Hommel & Co.; 110 csk., Havre, Sandoz Chemical Works; 41 csk. aniline, Havre, Ciba Co.; 33 pkg. aniline, Havre, Geigy Co.; 4 dr. do., Havre, Carbic Color & Chemical Co.; 10 csk., Havre, W. F. Sykes & Co.; 2 csk. aniline, Havre, Irving Bank-Col. Trust Co.; 5 bbl., Hamburg, Carbic Color & Chemical Co.; 6 csk. aniline, Hamburg, Grasselli Chemical Co.

COAL-TAR DISTILLATE—47 dr., Liverpool, Monsanto Chemical Works, 142 dr., Liverpool, Order; 14 bbl., Hamburg, Order.

CUTCH—50 bx., Rangoon, Order; 500 bg., Singapore, Order.

DIVI-DIVI—976 bg., Curacao, Selma Mercantile Corp.

DYESTUFFS—3 pkg., Genoa, American Exchange National Bank; 5 bbl., Genoa, Banco Comm. Italo.

EPSOM SALT—1,000 bg., Hamburg, Innis, Speiden & Co.; 500 bg., Hamburg, A. Klipstein & Co.

FELDSPAR—600 tons, Chatham, Oxford Soap Co.

FUSEL OIL—12 dr., Antwerp, Eastman Kodak Co.; 19 dr., Antwerp, Guaranty Trust Co.; 7 dr., Antwerp, Maas & Waldstein; 11 dr., Rotterdam, N. Y. Trust Co.; 2 dr., Genoa, G. W. Sheldon & Co.; 2 csk., Marseilles, Maas & Waldstein; 9 dr., Dunkirk, Order.

FLUOR SPAR—Quantity in bulk (amount not specified), Manchester, W. R. Grace & Co.

FULLERS EARTH—20 bg., Bristol, Common Bros.

GLAUBER SALT—100 bg., Hamburg, A. J. Marcus, Inc.

GAMBIER—139 bg. cube, Singapore, Order; 1,700 cs, Asahan, Arbuthnot, Latham & Co.

GRAPHITE—1113 bg., Marseilles, Order.

GUMS—49 cs. tragacanth, Southampton, Order; 105 cs. damar, Singapore, Baring Bros. & Co.; 64 bg. olibanum, Aden, Order; 10 bg. myrrh, Aden, Order; 22 cs. tragacanth, Southampton, Thurston & Braidich; 307 bg. yacca, Port Adelaide, Baring Bros. & Co.; 692 pkg. copal, Macassar, L. C. Gillespie & Son; 202 bskt. copal, Macassar, S. Winterbourne & Co.; 150 bskt. copal, Macassar, American Exchange National Bank; 42 bg. copal, Macassa, Order; 825 bg. arabic, Port Sudan, Brown Bros. & Co.; 525 bg. arabic, Port Sudan, Thurston & Braidich; 363 bg. arabic, Port Sudan, Order.

IRON OXIDE—75 csk., Hull, J. L. Smith & Co.; 28 csk., Manchester, Order; 24 csk., Liverpool.

LOGWOOD—1 lot, Cape Haitian, Stamford Dyewood Co.

LOGWOOD EXTRACT—163 bbl., Cape Haitian, Logwood Mfg. Co.

MANGANESE—21 csk. sulphate, Manchester, Order.

MAGNESITE—313 bg., Rotterdam, Speiden, Whitfield Co.

MAGNESIUM CHLORIDE—183 bbl., Hamburg, Innis, Speiden & Co.

MAGNESIUM SILICATE—75 bbl., Hamburg, L. Sonneborn Sons.

MYROBALANS—8,000 pkt., Calcutta, National City Bank; 700 pkt., Calcutta, Order; 9,970 pkt., Calcutta, Order.

MENTHOL—20 cs., Kobe, S. W. Bridges & Co.; 20 cs. Kobe, Stallman & Co.

MANGROVE BARK—644 sk., Marseilles, Cie Lyon de Madagascar; 342 sk., Marseilles, Order.

NAPHTHALENE—457 bg., Bristol, Order; 126 bbl., Glasgow, Order.

NUTGALLS—600 pkg., Hankow, Order.

OCHER—70 csk., Marseilles, C. F. Gledhill & Co.

OILS—China Wood—151 csk., Shanghai, Equitable Trust Co.; 600 bbl., Shanghai, Anderson, Meyer & Co.; 800 csk., Shanghai, Bradford Co.; 2 bbl., Tientsin, Int'l Banking Corp.; 56 csk., Canton, B. C. Ritchie; 2,403 cs., Hankow, Order. **Coconut**—1,915,286 lb. (bulk), Manila, Philippine Refining Corp. **Cod**—111 csk., St. Johns, National Oil Products Co.; 30 csk., St. Johns, R. Badcock & Co. **Linseed**—471 bg. oxidized, Hull, Nairn Linoleum Co.; 877 bbl., Hull, Order; 130 dr., Rotterdam, W. Van Doorn. **Olive Oil Foots (sulphur oil)**—1,568 bbl., Monopoli, Merchants National Bank of Boston; 712 bbl., Monopoli, Order. **Palm**—15 csk., Liverpool, Order; 879 csk., Rotterdam, African & Eastern Trading Corp. **Rapeseed**—5 bbl. blown, Hull, R. Badcock & Co.; 225 bbl. refined, Hull, Battery Park National Bank; 268 bbl. crude and 805 tons crude (bulk), Hull, Vacuum Oil Co.; 850 bbl., Hull, Order; 100 bbl., Rotterdam, Order. **Seal**—22 csk., St. Johns, National Oil Products Co.; 10 csk., St. Johns, R. Badcock & Co. **Whale**—12 csk., St. Johns, National Oil Products Co.

OIL SEEDS—Castor—33 bg., Port de Paix, Huttlinger & Struller. **Linseed**—46,828 bg., Buenos Aires, Spencer Kellogg & Sons; 42,154 bg., Buenos Aires, Order.

PHOSPHORUS—300 cs., Havre, W. E. Miller.

POTASSIUM SALTS—110 csk., Hamburg, Roessler & Hasslacher Chemical Co.; 3,000 bbl. chlorate, Hamburg, Irving Bank-Col Trust Co.; 5 parcels potash salts (quantity not specified), Hamburg, Potash Importing Corp. of America; 21 csk. prussiate, Copenhagen, Superfos Co.

PITCH—200 pkg., Hamburg, Asia Drug Co.

PLUMBAGO—154 bbl., Colombo, McCullough, Dalzell Crucible Co.; 200 bbl., Colombo, Paterson, Boardman & Knapp; 100 bbl., Colombo, H. W. Peabody & Co.

QUEBRACHO—4,040 bg., Buenos Aires, Illinois Merchantile Trading Co.; 5096 bg., Buenos Aires, C. A. Andresen; 950 bg., Buenos Aires, Fourth Atlantic National Bank; 2976 bg., Buenos Aires, Order.

QUICKSILVER—100 flasks, Genoa, Order; 200 flasks, Leghorn, Order.

RED EARTH—320 bg. and 50 bbl., Bristol, G. Collins & Co.; 19 csk., Bristol, Order.

SHELLAC—100 bg., Calcutta, British Overseas Bank; 72 bg., Calcutta, Philadelphia National Bank; 550 bg., Calcutta, Chase National Bank; 450 bg. and 50 cs., Calcutta, Brown Bros. & Co.; 686 bg. and 41 cs., Calcutta, Order; 130 bg. refuse lac., Calcutta, Order; 105 cs. sticklac, Bangkok, Order; 13 cs., Rotterdam, Gerlach Co.; 250 cs., Calcutta, Brown Bros. & Co.; 457 pkg., Calcutta, Philadelphia National Bank; 50 bg., Calcutta, Everett, Carleton & Co.; 100 bg., Calcutta, Mac-Lac Co.; 1,650 bg., seed lac, Calcutta, Bank of the Manhatan Co.; 651 bg. and 287 bg. seed lac, Calcutta, Order; 80 cs. garnet, Hamburg, A. Murphy & Co.

SIENNA—120 csk., Genoa, Reichard-Coulston, Inc.; 47 csk., Genoa, J. Lee Smith & Co.

SODIUM SALTS—106 dr. salts, Hamburg, C. S. Grant & Co.; 70 dr. sulphite, Bristol, R. F. Downing & Co.; 168 csk. cyanide, Havre, Asia Banking Corp.; 120 cs. cyanide, Havre, Hardy & Rupertis; 34 cs. prussiate, Rotterdam, Meteor Products Co.; 11,411 bg. nitrate, Antofagasta, W. R. Grace & Co.; 45 dr. sulphite, Hamburg, C. S. Grant & Co.

SUMAC—700 bg., Palermo, R. Neumond; 910 bg., Palermo, Order; 350 bg. ground, Palermo, American Express Co.

TALC—500 bg., Genoa, L. A. Salomon & Bro.; 700 bg., Genoa, Italian Discount & Trust Co.; 500 bg., Genoa, Parfume de Luxe Coty.

TARTAR—265 bg., crude, Lisbon, C. Pfizer & Co.; 193 bg., Tarragona, Tartar Chemical Co., 27 bbl., Bristol, Royal Baking Powder Co.; 49 csk., Leghorn, Royal Baking Power Co.; 84 csk., Naples, Tartar Chemical Works; 2 bbl., Naples, Order; 344 sk., Oran, Tartar Chemical Works.

WAXES—375 bg. montan, Hamburg, I. S. Tainter; 24 bg. bees, Southampton, Order; 275 bg. paraffine, Liverpool, Order; 25 bg. carnauba, Vera Cruz, Order; 80 bg. paraffine, Glasgow, Smith & Nichols, Inc.; 30 bg. bees, Rotterdam, Ponds Extract Co.; 43 bg. bees, Rotterdam, Order; 112 bg. bees, Valparaiso, W. R. Grace & Co.; 86 bg. bees, San Antonio, Guaranty Trust Co.; 13 pkg. bees, Monte Cristy, Order.

WHITING—200 bg., Hull Martin Cautine Co.; 200 bg., Hull, C. B. Chrystal Co.; 50 bg., Hull, Order; 200 bg., Manchester, L. A. Salomon & Bros.; 200 bg., Manchester, Whittaker, Clark & Daniels.

WOOL GREASE—40 bbl., Bremen, Pfaltz & Bauer.

ZINC SULPHITE—2 csk., Southampton, C. A. Sykes.

Drawback Allowances

The Treasury Department announced on Wednesday that drawback allowances had been granted in seventeen commodities. Among these were linseed oil, oil cake and oil meal manufactured by the John T. Lewis & Bros. Co. of Philadelphia from imported flaxseed; on linseed oil, oil cake and oil meal manufactured by the National Lead Co., from imported flaxseed; on flavoring extract manufactured by the Whistle Laboratory of New York, with the use of domestic tax-paid alcohol.

London Tallow Auction

At the regular weekly auction of tallow, held in London Aug. 28, prices were unchanged to 6d. lower. Offerings consisted of 1,251 casks, but only 832 were disposed of.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 –	$0.25½
Acid, acetic, 28%, bbl.	100 lb.	3.38 –	3.50
Acetic, 56%, bbl.	100 lb.	6.75 –	7.00
Acetic, 80%, bbl.	100 lb.	9.58 –	9.83
Glacial, 99½%, bbl.	100 lb.	12.00 –	12.78
Acetic anhydride, 85%, dr.	lb.	.38 –	....
Boric, bbl.	lb.	.10½–	....
Citric, kegs	lb.	.49 –	.50
Formic, 85%	lb.	.12 –	.14
Gallic, tech.	lb.	.45 –	.50
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½–	.12
22% tech., light, bbl.	lb.	.05½–	.06
Muriatic, 18° tanks	100 lb.	.90 –	1.00
Muriatic, 20°, tanks	100 lb.	1.00 –	1.10
Nitric, 36°, carboys	lb.	.04½–	.05
Nitric, 42°, carboys	lb.	.06 –	.06½
Oleum, 20%, tanks	ton	18.50 –	19.00
Oxalic, crystals, bbl.	lb.	.12 –	.12½
Phosphoric, 50% carboys	lb.	.07½–	.08½
Pyrogallic, resublimed	lb.	1.50 –	1.60
Sulphuric, 60°, tanks	ton	11.00 –	12.00
Sulphuric, 60°, drums	ton	13.00 –	14.00
Sulphuric, 66°, tanks	ton	15.00 –	16.00
Sulphuric, 66° drums	ton	20.00 –	21.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.33 –	.34
Tartaric, domestic, bbl.	lb.	.36 –	....
Tungstic, per lb.	lb.	1.10 –	1.20
Alcohol, butyl, drums, f.o.b. works	lb.	.26 –	.28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.78 –	....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.75 –	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.44 –	...
No. 1, 190 proof, special, dr.	gal.	.38 –	...
No. 1, 188 proof, bbl.	gal.	.45 –	...
No. 1, 188 proof, dr.	gal.	.39 –	...
No. 5, 188 proof, bbl.	gal.	.43 –	...
No. 5, 188 proof, dr.	gal.	.37 –	...
Alum, ammonia, lump, bbl.	lb.	.03½–	.04
Potash, lump, bbl.	lb.	.03 –	.04½
Chrome, lump, potash, bbl.	lb.	.06 –	.07
Aluminum sulphate, com., bags	100 lb.	1.40 –	1.50
Iron free bags	lb.	2.40 –	2.50
Aqua ammonia, 26°, drums	lb.	.07 –	.07½
Ammonia, anhydrous, cyl.	lb.	.30 –	.30½
Ammonium carbonate, powd. casks, imported	lb.	.09½–	.10
Ammonium carbonate, powd. domestic, bbl.	lb.	.13 –	.14
Ammonium nitrate, tech., casks	lb.	.10 –	.11
Amyl acetate tech., drums	gal.	4.50 –	4.75
Antimony Sulphuret, golden.	lb.	.19 –	.20
Arsenic, white, powd., bbl.	lb.	.09½–	.10½
Arsenic, red, powd., kegs	lb.	.15 –	.15½
Barium carbonate, bbl.	ton	65.00 –	70.00
Barium chloride, bbl.	ton	82.00 –	90.00
Barium dioxide, drums	lb.	.18 –	.18½
Barium nitrate, casks		.08 –	.08½
Blanc fixe, dry, bbl.	lb.	.04 –	.04½
Bleaching powder, f.o.b. wks., drums	100 lb.	1.50 –	1.75
Spot N. Y. drums	100 lb.	2.00 –	2.10
Borax, bbl.	lb.	.05½–	.05½
Bromine, cases	lb.	.28 –	.30
Calcium acetate, bags	100 lb.	4.00 –	4.05
Calcium arsenate, dr.	lb.	.13 –	.14
Calcium carbide, drums	lb.	.05½–	.05½
Calcium chloride, fused, dr. wks.	ton	21.00 –	....
Gran. drums works	ton	27.00 –	....
Calcium phosphate, mono, bbl.	lb.	.06½–	.07
Camphor, cases	lb.	.86 –	.88
Carbon bisulphide, drums	lb.	.07 –	.07½
Carbon tetrachloride, drums	lb.	.09 –	.09½
Chalk, precip.—domestic, light, bbl.	lb.	.04½–	.04½
Domestic, heavy, bbl.	lb.	.03½–	.03½
Imported, light, bbl.	lb.	.04½–	.05
Chlorine, liquid, tanks, wks.	lb.	.05½–	.05½
Cylinders, 100 lb., wks.	lb.	.06 –	.06½
Cylinders, 100 lb., spot	lb.	.09 –	....
Chloroform, tech., drums	lb.	.28 –	.32
Cobalt oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	20.00 –	21.00
Copper carbonate, bbl.	lb.	.18 –	.19
Copper cyanide, drums	lb.	.47 –	.50
Copper sulphate, dom., bbl., 100 lb.		5.10 –	5.25
Imp. bbl.	100 lb.	4.60 –	4.65
Cream of tartar, bbl.	lb.	.24½–	.26
Epsom salt, dom., tech., bbl.	100 lb.	1.75 –	2.00
Epsom salt, imp., tech., bags	100 lb.	.90 –	1.00
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 –	2.50
Ether, U.S.P., resale, dr.	lb.	.13 –	.15
Ethyl acetate, 85%, drums	gal.	.80 –	.81
Ethyl acetate, ether, 98% to 100%)	gal.	$0.95 –	$1.00
Formaldehyde, 40%, bbl.	lb.	.13½–	.13½
Fullers earth—imp., powd., net	ton	30.00 –	32.00
Fusel oil, ref., drums	gal.	.... –	....
Fusel oil, crude, drums	gal.	4.00 –	4.25
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Glaubers salt, imp., bags	100 lb.	.90 –	.95
Glycerine, c.p., drums extra	lb.	.17 –	.17½
Glycerine, dynamite, drums	lb.	.15½–	.16
Glycerine, crude 80%, loose	lb.	.11 –	....
Iron oxide, red, casks	lb.	.12 –	.18
Lead:			
White, basic carbonate, dry, casks	lb.	.09½–	.09½
White, basic sulphate, casks	lb.	.08½–	.09
White, in oil, kegs	lb.	.11½–	.11½
Red, dry, casks	lb.	.10½–	.10½
Red, in oil, kegs	lb.	.13 –	.14½
Lead acetate, white crys., bbl.	lb.	.14 –	.14½
Brown, broken, casks	lb.	.13 –	.13½
Lead arsenate, powd., bbl.	lb.	.18 –	.20
Lime-Hydrated, bg, wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lime, Lump, bbl	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.10½–	.10½
Lithophone, bags	lb.	.07 –	.07½
in bbl.	lb.	.07½–	.07½
Magnesium carb., tech., bags	lb.	.08 –	.08½
Methanol, 95%, bbl.	gal.	1.18 –	1.20
Methanol, 97%, bbl.	gal.	1.20 –	1.22
Methyl-acetone, t'ks.	gal.	1.15 –	....
Nickel salt, double, bbl.	lb.	.10½–	....
Nickel salts, single, bbl.	lb.	.11½–	....
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.... –	....
Phosphorus, yellow, cases	lb.	.35 –	.40
Potassium bichromate, casks	lb.	.10 –	....
Potassium bromide, gran., bbl.	lb.	.19 –	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½–	.06½
Potassium chlorate, powd.	lb.	.07 –	.08½
Potassium cyanide, drums	lb.	.47 –	.52
Potassium, first sorts, cask	lb.	.07½	.08
Potassium hydroxide (caustic potash) drums	lb.	.07½–	.09
Potassium iodide, cases	lb.	3.65 –	3.75
Potassium nitrate, bbl.	lb.	.07½–	.09
Potassium permanganate, drums	lb.	.17 –	.17½
Potassium prussiate, red, casks	lb.	.60 –	.63
Potassium prussiate, yellow, casks	lb.	.33 –	....
Salammoniac, white, gran., casks, imported	lb.	.05½–	.06
Salammoniac, white, gran., bbl., domestic	lb.	.07½–	.07½
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk)	ton	26.00 –	28.00
Soda ash, light, 58% flat, bags, contract	100 lb.	1.45 –	1.50
Soda ash, light, 58%, flat, bags, resale	100 lb.	1.70 –	1.75
Soda ash, dense, bags, contract, basis 58%	100 lb.	1.51 –	....
Soda ash, dense, in bags, resale	100 lb.	1.85 –	1.90
Soda, caustic, 76%, solid, drums	100 lb.	3.16 –	....
Soda, caustic, ground and flake, contracts	100 lb.	3.60 –	3.85
Soda, caustic, solid, 76% f. a. s. N. Y.	100 lb.	3.15 –	3.25
Sodium acetate, works, bags	lb.	.05½–	.05½
Sodium bicarbonate, bbl.	100 lb.	2.00 –	2.50
Sodium bichromate, casks	lb.	.07½–	.08
Sodium bisulphate (niter cake)	ton	6.00 –	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½–	.04½
Sodium chlorate, kegs	lb.	.06½–	.07
Sodium chloride	long ton	12.00 –	13.00
Sodium cyanide, cases	lb.	.19 –	.22½
Sodium fluoride, bbl.	lb.	$0.08½–	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½–	.03
Sodium nitrite, casks	lb.	.07½–	.07½
Sodium peroxide, powd., cases	lb.	.28 –	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½–	.04
Sodium prussiate, yel. drums	lb.	.13½–	.14
Sodium salicylic, drums	lb.	.40 –	.45
Sodium silicate (40°, drums)	100 lb.	.75 –	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 –	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 –	.04
Sodium sulphite, crys., bbl.	lb.	.03½–	.03½
Strontium nitrate, powd., bbl.	lb.	.10 –	.11
Sulphur chloride, yel drums	lb.	.04½–	.05
Sulphur, crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Sulphur, flour, bag	100 lb.	2.25 –	2.35
Sulphur, roll, bag	100 lb.	2.00 –	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 –	.08½
Tin bichloride, bbl.	lb.	.11½–	.12
Tin oxide, bbl.	lb.	.45 –	....
Tin crystals, bbl.	lb.	.30½–	.31
Zinc carbonate, bags	lb.	.14 –	.14½
Zinc chloride, gran, bbl.	lb.	.06½–	.06½
Zinc cyanide, drums	lb.	.37 –	.38
Zinc oxide, , lead free, bbl.	lb.	.08 –	.08½
5% lead sulphate, bags	lb.	.07½–	....
10 to 35 % lead sulphate, bags	lb.	.07 –	....
French, red seal, bags	lb.	.09½–	....
French, green seal, bags	lb.	.10½–	....
French, white seal, bbl.	lb.	.12 –	....
Zinc sulphate, bbl.	100 lb.	2.50 –	3.00

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 –	$0.70
Alpha-naphthol, ref., bbl.	lb.	.68 –	.80
Alpha-naphthylamine, bbl.	lb.	.34 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salts, bbl.	lb.	.22 –	.23
Anthracene, 80%, drums	lb.	.75 –	.80
Anthracene, 80%, imp., drums, duty paid	lb.	.65 –	.70
Anthraquinone, 25%, paste, drums	lb.	.80 –	.85
Benzaldehyde U.S.P., carboys	lb.	1.50 –	....
f.f.c. drums	lb.	1.60 –	....
tech, drums	lb	75	....
Benzene, pure, water-white, tanks and drums	gal.	.27 –	.32
Benzene, 90%, tanks & drums	gal.	.25 –	.30
Benzidine base, bbl.	lb.	.80 –	.85
Benzidine sulphate, bbl.	lb.	.75 –	....
Benzoic acid, U.S.P., kegs	lb.	.75 –	.80
Benzoate of soda, U.S.P., bbl.	lb.	.65 –	.70
Benzyl chloride, 95-97%, ref., drums	lb.	.45 –	....
Benzyl chloride, tech., drums	lb.	.30 –	.35
Beta-naphthol, tech., bbl.	lb.	.22 –	.23
Beta-naphthylamine, tech.	lb.	.75 –	.80
Cresol, U.S.P., drums	lb.	.25 –	.29
Ortho-cresol, drums	lb.	.28 –	.32
Cresylic acid, 97%, works drums	gal.	.85 –	.90
95-97%, drums, works	gal.	.75 –	.80
Dichlorbenzene, drums	lb.	.06 –	.08
Diethylaniline, drums	lb.	.50 –	.60
Dimethylaniline, drums	lb.	.41 –	.42
Dinitrobenzene, bbl.	lb.	.19 –	.20
Dinitrochlorbenzene, bbl.	lb.	.21 –	.22
Dinitronaphthalen, bbl.	lb.	.30 –	.32
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.20 –	.22
Dip oil, 25%, drums	gal.	.25 –	.30
Diphenylamine, bbl.	lb.	.50 –	.52
H-acid, bbl.	lb.	.75 –	.80
Meta-phenylenediamine, bbl.	lb.	1.00 –	1.05
Michlers ketone, bbl.	lb.	3.00 –	3.50
Monochlorbenzene, drums	lb.	.08 –	.10
Monoethylaniline, drums	lb.	.95 –	1.10
Naphthalene, flake, bbl.	lb.	.06½–	.07
Naphthalene, balls, bbl.	lb.	.07½–	.07½
Naphthionate of soda, bbl.	lb.	.58 –	.65
Naphthionic acid, crude, bbl.	lb.	.55 –	.60
Nitrobenzene, drums	lb.	.10 –	.12
Nitro-naphthalene, bbl.	lb.	.30 –	.35
Nitro-toluene, drums	lb.	.13½–	.14½
N-W acid, bbl.	lb.	1.25 –	1.30
Ortho-amidophenol, kegs	lb.	2.30 –	2.35
Ortho-dichlorbenzene, drums	lb.	.15 –	.17
Ortho-nitrophenol, bbl.	lb.	1.20 –	1.30
Ortho-nitrotoluene, drums	lb.	.10 –	.12
Ortho-toluidine, bbl.	lb.	.14 –	.15
Para-amiñophenol, base, kegs	lb.	1.35 –	....
Para-amiñophenol, HCl, kegs	lb.	1.55 –	....
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Paranitroaniline, bbl.	lb.	.72 –	.74
Para-nitrotoluene, bbl.	lb.	.60 –	.65
Para-phenylenediamine, bbl.	lb.	1.45 –	1.50
Para-toluidine, bbl	lb.	.90 –	.95
Phthalic anhydride, bbl.	lb.	.35 –	.38
Phenol, U.S.P., dr.	lb.	.28 –	.32
Picric acid, bbl.	lb.	.20 –	.22
Pyridine, dom., drums	gal.	nominal	
Pyridine, imp., drums	gal.	4.75 –	5.00
Resorcinol, tech., kegs	lb.	1.40 –	1.50

Resorcinol, pure, kegs	lb.	$2.25 –	....
R-salt, bbl.	lb.	.55 –	$0.60
Salicylic acid, tech., bbl.	lb.	.32 –	....
Salicylic acid, U.SP., bbl.	lb.	.35 –	....
Solvent naptha, water-white, tanks	gal.	.27 –	....
Crude, tanks	gal.	.24 –	....
Sulphanilic acid, crude, bbl.	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Tolidine, bbl	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars	gal.	.30 –	.32
Toluene, drums	gal.	.34 –	.36
Xylidine drums	lb.	.50 –	....
Xylene, pure, drums	gal.	.60 –	.65
Xylene, com., drums	gal.	.34 –	.....
Xylene, com., tanks	gal.	.29 –	.....

Naval Stores

Rosin B-D, bbl.	280 lb.	$5.75 –	$5.80
Rosin E-I, bbl.	280 lb.	5.90 –	.....
Rosin K-N, bbl.	280 lb.	5.90 –	6.15
Rosin W.G.-W.W., bbl.	280 lb.	6.50 –	7.25
Wood rosin bbl.	280 lb.	5.90 –	6.00
Turpentine, spirits of, bbl.	gal.	.95 –	....
Wood, steam dist., bbl.	gal.	.75 –	....
Wood, dest. dist., bbl.	gal.	.60 –	....
Pine tar pitch, bbl.	200 lb.	5.50 –	.....
Tar, kiln burned, bbl.	500 lb.	11.00 –	.....
Retort tar, bbl.	500 lb.	11.00 –	.....
Rosin oil, first run, bbl.	gal.	.42 –	.....
Rosin oil, second run, bbl.	gal.	.48 –	.....
Rosin oil, third run, bbl.	gal.	.52 –	.....
Pine oil, steam dist.	gal.	.70 –	.....
Pine oil, pure, dest. dist.	gal.	.65 –	.....
Pine tar oil, ref.	gal.	.48 –	.....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.32 –	.32½
Pine tar oil, double ref., bbl.	gal.	–	.75
Pine tar, ref., thin, bbl.	gal.	–	.25
Pinewood creosote, ref., bbl.	gal.	–	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0 4 –	$0.04½
Grease yellow, bbl.	lb.	.06½ –	.06½
Lard oil, Extra No. 1, bbl.	gal.	.86 –	.88
Neatsfootoil 20 deg. bbl.	gal.	1.20 –	1.25
No 1, bbl.	gal.	.92 –	.94
Oleo Stearine	lb.	.10½ –	.....
Oleo oil, No. 1, bbl.	lb.	.12½ –	.12½
Red oil, distilled, d.p. bbl.	lb.	.09½ –	.....
Saponified, bbl.	lb.	.09½ –	.....
Tallow, extra, loose	lb.	.07½ –	.....
Tallow oil, acidless, bbl.	gal.	82	.84

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.13 –	.....
Castor oil, No. 1, bbl.	lb	.13½ –	.....
Chinawood oil, bbl.	lb.	.22 –	.23½
Coconut oil, Ceylon, bbl.	lb.	.09½ –	.....
Ceylon, tanks, N.Y.	lb.	.08½ –	.....
Coconut oil, Cochin, bbl.	lb.	.10 –	.....
Corn oil, crude, bbl.	lb.	.10 –	.....
Crude, tanks, (f.o.b. mill)	lb.	.08½ –	.....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½ –	.....
Summer yellow, bbl.	lb.	.11 –	.11½
Winter yellow, bbl.	lb.	.12½ –	.12½
Linseed oil, raw, car lots, bbl.	gal.	.88 –	.....
Raw, tank cars (dom.)	gal.	.83 –	.....
Boiled, cars, bbl. (dom.)	gal.	.90 –	.....
Olive oil, denatured, bbl.	gal.	1.10 –	1.12
Sulphur, (foots) bbl.	lb.	.08½ –	.08½
Palm, Lagos, casks	lb.	.07½ –	.....
Niger casks	lb.	.06½ –	.....
Palm kernel, bbl.	lb.	.08½ –	.08½
Peanut oil, crude, tanks (mill)	lb.	.10½ –	.....
Peanut oil, refined, bbl.	lb.	.13½ –	.14
Perilla, bbl	lb.	.14½ –	.15½
Rapeseed oil, refined, bbl.	gal.	.77 –	.....
Rapeseed oil, blown, bbl.	gal.	.82 –	.....
Sesame, bbl.	lb.	.11½ –	.11½
Soya bean (Manchurian), bbl.	lb.	.10 –	.....
Tank, f.o.b. Pacific coast	lb.	.08½ –	.....
Tank, (f.o.b. N.Y.)	lb.	.09 –	.....

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.63 –	.....
Menhaden, light pressed, bbl.	gal.	.63 –	.....
White bleached, bbl.	gal.	.65 –	.....
Blown, bbl.	gal.	.69 –	.....
Crude, tanks (f.o.b. factory)	gal.	.40 –	.....
Whale No. 1 crude, tanks, coast	lb.	–	.....
Winter, natural, bbl.	gal.	.76 –	.78
Winter, bleached bbl.	gal	.79 –	.80

Oil Cake and Meal

Coconut cake, bags	ton	$26.00 –	$28.00
Copra, sun dried, bags, (c.i.f.)	lb.	.05 –	.05½
Sun dried Pacific coast	lb.	.04½ –	.....
Cottonseed meal, f.o.b. mills	ton	38 00 –	.....
Linseed cake, bags	ton	35 00 –	.....
Linseed meal, bags	ton	37 00 –	38.00

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45 –	$0.50
Albumen, egg, tech, kegs	lb.	.95 –	1.00
Cochneal, bags	lb	.34 –	.36
Cutch, Borneo, bales	lb.	.04 –	.04½
Cutch, Rangoon, bales	lb.	.13½ –	.14
Dextrine, corn, bags	100 lb.	3.79 –	4.06½
Dextrine gum, bags	100 lb.	4.14 –	4.34
Divi-divi, bags	ton	38.00 –	39.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Logwood, sticks	ton	26.00 –	28.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	78.00 –	80.00
Sumac, ground, bags	ton	$72.00 –	$75.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags	100 lb.	3.12 –	3.39
Tapioca flour, bags	lb.	.07 –	.07½

Extracts

Archil, conc., bbl.	lb.	$0.18 –	$0.22
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl.	lb.	.04 –	.05
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.08 –	.09
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½ –	.10½
Logwood, crys., bbl.	lb.	.16 –	.17
Logwood, liq., 51°, bbl.	lb.	.08½ –	.09
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.05
Sumac, dom., 51°, bbl.	lb.	.06½ –	.07½

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, spot	lb.	$0.17 –	$0.21
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.50 –	.55
Prussian, bbl.	lb.	.50 –	.55
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.06 –	.14
Sienna, Domestic, bbl.	lb.	.03½ –	.04
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P.Light, bbl.	lb.	.32 –	.34
Chrome, commercial, bbl.	lb.	.12 –	.12½
Paris, bulk	lb.	.28 –	.30
Reds, Carmine No. 40, tins	lb.	4.50 –	4.70
Oxide red, casks	lb.	.10 –	.14
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl.	lb.	1.20 –	1.25
Yellow, Chrome, C.P. bbls.	lb.	.20 –	.21
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl.	lb.	$0.27 –	$0.28
Beeswax, crude, bags	lb.	.21 –	.26
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candelilla, bags	lb.	.22 –	.23
Carnauba, No. 1, bags	lb.	.42 –	.42½
No. 2, North Country, bags	lb.	.23 –	.23½
No. 3, North Country, bags	lb.	.17½ –	.17½
Japan, cases	lb.	.15½ –	.15½
Montan, crude, bags	lb.	.05 –	.....
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.04½ –	.04½
Crude, scale 124-126 m.p., bags	lb.	.02½ –	.03
Ref., 118-120 m.p., bags	lb.	.03½ –	.....
Ref., 125 m.p., bags	lb.	.03½ –	.....
Ref. 128-130 m.p., bags	lb.	.03½ –	.....
Ref., 133-135 m.p., bags	lb.	.04 –	.04½
Ref., 135-137 m.p., bags	lb.	.05½ –	.05½
Stearic acid, agle pressed, bags	lb.	.12½ –	.12½
Double pressed, bags	lb.	.12½ –	.13
Triple pressed, bags	lb.	.14 –	.14½

Fertilizers

Ammonium sulphate, bulk, f.o.b. works	100 lb.	$3.20 –	$3.25
F.a.s. double bags	100 lb.	3.50 –	3.55
Blood, dried, bulk	unit	4.00 –	.....
Bone, raw, 3 and 50, ground	ton	27.00 –	30.00
Fish scrap, dom., dried, wks.	unit	3.75 –	.....
Nitrate of soda, bags	100 lb.	2.45 –	2.52½
Tankage, high grade, f.o.b. Chicago	unit	3.60 –	3.75
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	4.00 –	4.50
Tennessee, 78-80%	ton	8.00 –	8.25
Potassium muriate, 80%, bags	ton	34.55 –	.....
Potassium sulphate, bags basis 90%	ton	43.67 –	.....
Double manure salt	ton	25.72 –	.....
Kainit	ton	7.22 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.28½ –	.....
Upriver coarse	lb.	.24 –	.....
Upriver caucho ball	lb.	.24½ –	.....
Plantation—First latex crepe	lb.	.29½ –	.....
Ribbed smoked sheets	lb.	.29½ –	.....
Brown crepe, thin, clean	lb.	.28½ –	.....
Amber crepe No. 1	lb.	.29 –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.12½ –	$0.13½
East Indian, bold, bags	lb.	.23 –	.23½
Manila, pale, bags	lb.	.20 –	.20½
Pontinak, No. 1 bags	lb.	.20 –	.20½
Damar, Batavia, cases	lb.	.28 –	.28½
Singapore, No. 1, cases	lb.	.32 –	.33
Singapore, No. 2, cases	lb.	.23½ –	.24
Kauri, No. 1, cases	lb	.68 –	.70
Ordinary chips, cases	lb.	.23 –	.24
Manjak, Barbados, bags	lb.	.09 –	.09½

Shellac

Shellac, orange fine, bags	lb.	$0.61 –	$0.62
Orange superfine, bags	lb.	.63 –	.64
A. C. garnet, bags	lb.	.59 –	.....
Bleached, bonedry	lb.	.70 –	.71
Bleached, fresh	lb.	.58 –	.59
T. N., bags	lb.	.58 –	.59

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh. ton	$375.00 –	$500.00
Asbestos, shingle, f.o.b., Quebec	sh. ton	$55.00 –	$60.00
Asbestos, cement, f.o.b., Quebec	sh. ton	20.00 –	25.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	16.00 –	20.00
Barytes, grd., off-color, f.o.b. mills bulk	net ton	13.00 –	15.00
Barytes, floated, f.o.b. St. Louis, bbl.	net ton	28.00 –	.....
Barytes, crude f.o.b. mines, bulk	net ton	8.00 –	10.00
Casein, bbl., tech	lb.	.13½ –	.15½
China clay (kaolin) crude, f.o.b. Ga.	net ton	6.00 –	8.00
Washed, f.o.b. Ga.	net ton	8.00 –	9.00
Powd., f.o.b. Ga.	net ton	14.00 –	20.00
Crude f.o.b. Va.	net ton	6.00 –	8.00
Ground, f.o.b. Va.	net ton	13.00 –	19.00
Imp., lump, bulk	net ton	15.00 –	20.00
Imp., powd.	net ton	45.00 –	50.00
Feldspar, No. 1 pottery	long ton	7.50 –	.....
No. 2 pottery	long ton	6.00 –	.....
No. 1 soap	long ton	8.50 –	.....
No. 1 Canadian, f.o.b. mill	long ton	18.00 –	20.00
Graphite, Ceylon, lump, first quality, bbl.	lb.	.06 –	.06½
Ceylon, chip, bbl.	lb.	.04½ –	.05
High grade amorphous crude	ton	15.00 –	30.00
Gum arabic, amber, sorts, bags	lb.	.14 –	.14½
Gum tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.50 –	1.60
Kieselguhr, f.o.b. Cal.	ton	40.00 –	42.00
F.o.b. N. Y.	ton	50.00 –	55.00
Magnesite, crude, f.o.b. Cal.	ton	14.00 –	15.00
Pumice stone, imp., casks	lb.	.03 –	.05½
Dom., lump, bbl.	lb.	.05 –	.05½
Dom., ground, bbl.	lb.	.05½ –	.06
Silica, glass sand, f.o.b. Ind.	ton	2.00 –	2.50
Silica, sand blast, f.o.b. Ind.	ton	2.50	5.00
Silica, amorphous, 250-mesh, f.o.b. Ill.	ton	17.00 –	17.50
Silica, glass sand, f.o.b. Ill.	ton	1.50 –	3.00
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags	ton	6.50 –	9.00
Talc, 200 mesh, f.o.b. Ga., bags	ton	7.00 –	9.00
Talc, 200 mesh, f.o.b. Los Angeles, bags	ton	18.00 –	20.00

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.75 –	.....
Corning	bbl.	1 60 –	.....
Cabell	bbl.	1 50 –	.....
Somerset	bbl.	1 40 –	.....
Illinois	bbl.	1 67 –	.....
Indiana	bbl.	1 68 –	.....
Kansas and Oklahoma, 28 deg.	bbl.	1 20 –	.....
California, 35 deg. and up	bbl.	1 04 –	.....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.19½ –	.....
Naphtha, V. M. & P. deod, steel bbls.	gal	.18½ –	.....
Kerosene, ref. tank wagon	gal.	.14 –	.....
Bulk, W.W. delivered, N.Y.	gal.	.06 –	.....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.21 –	.....
Bloomless, 30@31 grav.	gal.	.18 –	.....
Paraffin, pale	gal.	.15 –	.17
Spindle, 200, pale	gal.	.20½ –	.21
Petrolatum, amber, bbls.	lb.	.03½ –	.04
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140-145
Chrome brick, f.o.b. Eastern shipping points	ton	50–52
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	45–47
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	41–43
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	53–55
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	53–55
F.o.b. Mt. Union, Pa.	1,000	45–47
Silicon carbide refract. brick, 9-in.	1,000	1,100.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00 –	$225.00
Ferrochromium, per lb. of Cr, 6-8% C	lb.	.07 –	.08
4-6% C	lb.	.10 –	.12
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	117.50 –	.....
Spiegeleisen, 19-21% Mn.	gr. ton	45.00 –	47.00
Ferromolybdenum, 50-60% Mo, per lb Mo	lb.	2.00 –	2.50
Ferrosilicon, 10-15%	gr. ton	43.00 –	50.00
50%	gr. ton	85.00 –	.....
75%	gr. ton	135.00 –	155.00

Ferrotungsten, 70–80%, per lb. of W	lb.	$0.88 @ $0.95
Ferro-uranium, 35-50% of U. per lb. of U	lb.	3.50 – 4.50
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 – 4.50

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 – $8.75
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 – 23.00
C.i.f. Atlantic seaboard	ton	21.00 – 25.00
Coke, fdry., f.o.b. ovens	ton	5.50 – 5.75
Coke, furnace, f.o.b. ovens	ton	4.75 – 5.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50 –.....
Ilmenite, 52% TiO_2	lb.	.01½– .01¾
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.35 –.....
Manganese ore, chemica (MnO_2)	ton	80.00 – 85.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.65 – .70
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 – .08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 –.....
Rutile, 95% TiO_2	lb.	.12 –.....
Tungsten, scheelite, 60% WO_3 and over	unit	8.75 – 9.00
Tungsten, wolframite, 60% WO_3	unit	8.50 – 8.75
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 – 3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 – 2.50
Vanadium pentoxide, 99%	lb.	12.00 – 14.00
Vanadium ore, per lb. V_2O_5	lb.	.75 – 1.00
Zircon, washed, iron free, f.o.b. Pablo, Fla.	lb.	.02 – .10

Non-Ferrous Materials

	Cents per Lb.
Copper, electrolytic	13¼-13¾
Aluminum, 98 to 99%	26–27
Antimony, wholesale, Chinese and Japanese	7¼- 7¾
Nickel, virgin metal	27–29
Nickel, ingot and shot	30–32
Monel metal, shot and blocks	32.00
Monel metal, ingots	38.00
Monel metal, sheet bars	45.00
Tin, 5-ton lots, Straits	40.70
Lead, New York, spot	6.75
Lead, E. St. Louis, spot	6.60
Zinc, spot, New York	6.75
Zinc, spot, E. St. Louis	6.40

Other Metals

Silver (commercial)	oz.	$0.62¼
Cadmium	lb.	1.00
Bismuth (500 lb. lots)	lb.	2.55
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	1.25–.....
Platinum	oz.	116.00
Iridium	oz.	275.00@300.00
Palladium	oz.	80.00
Mercury	75 lb.	64.00–65.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	22.75
Copper bottoms	31.50
Copper rods	23 00
High brass wire	20 25
High brass rods	18 00
Low brass wire	21.75
Low brass rods	22.00
Brazed brass tubing	24.25
Brazed bronze tubing	28.50
Seamless copper tubing	27.00
Seamless high brass tubing	25.50

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	9.25@ 9.50
Copper, heavy and wire	11.25@11.50
Copper, light and bottoms	10.25@10.50
Lead, heavy	5.25@ 5.50
Lead, tea	3.25@ 3.37½
Brass, heavy	6.25@ 6.50
Brass, light	5.25@ 5.50
No. 1 yellow brass turnings	6.00@ 6.25
Zinc scrap	3.50@ 3.75

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.64	$3.64
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

BESSEMER—The Harbison-Walker Refractories Co., Farmers' Bank Bldg., Pittsburgh, Pa., manufacturer of firebrick, refractory shapes, etc., has acquired a tract of local land and has tentative plans under advisement for the erection of a new plant to cost approximately $500,000, with machinery.

MONTGOMERY—The National Carbon Co., Inc., 30 East 42nd St., New York, is considering plans for the establishment of a new local branch plant. Fred S. Ball, First National Bank Bldg., is local representative.

Arizona

KINGMAN—The Gold Dust Mines Co. will soon commence the erection of a new local mill, to develop an initial daily output of 50 tons. E. H. Kennard and H. E. Bierce will handle the construction. Arrangements for the machinery installation will be perfected at an early date.

Arkansas

FORT SMITH—The Model Window Glass Co. is planning for the rebuilding of the portion of its sheet glass plant, destroyed by fire, Aug. 17, with loss estimated at $225,000, including equipment.

California

LONG BEACH—The City Council is consummating arrangements for the purchase of the municipal artificial gas plant and system, to be operated as municipal property. A bond issue of $3,000,000 will be sold for the acquisition, and for proposed extensions and improvements.

FRESNO—The Chamber of Commerce has received an inquiry from Ray Miller and Edward P. Jones, Wichita Falls, Tex., operating a local glass-manufacturing plant, for a site at Fresno for the erection of a new works for Pacific Coast business. It will cost in excess of $80,000.

LOS ANGELES—Fire, Aug. 18, destroyed a portion of the plant of the General Petroleum Co., San Pedro Harbor, with loss reported at $1,000,000, including equipment.

NATIONAL CITY—The Atchison, Topeka & Santa Fe Railway Co., Los Angeles, has preliminary plans in progress for the erection of a new creosoting plant on local site, for treating ties, piling and other lumber. It will cost in excess of $100,000, including machinery.

SACRAMENTO—The Industrial Department, Chamber of Commerce, has negotiations in progress with Lincoln Messick and O. J. Lehrick, both of Kansas City, Mo., for the establishment of a new local plant for the manufacture of paints and varnishes. A site will be selected at an early date.

TRACY—The Alameda Sugar Co., 310 Sansome St., San Francisco, is considering plans for the resumption of operations at its plant at Tracy, closed for some time past, and will make extensions and improvements, including machinery repairs and replacements. George E. Springer is general manager.

Connecticut

NEW LONDON—The Alling Rubber Co. has awarded a general contract to Arthur Jackson & Co., New London, for the erection of a new 3-story building on State St., to cost about $80,000.

Delaware

NEW CASTLE—The Delaware Steel Products Co., recently organized, has acquired property adjoining the local works of the Deemer Steel Casting Co., as a site for the erection of a new plant for the manufacture of a special alloy, designed to reclaim low-carbon steel, producing a high grade of hard steel. The initial works will consist of a number of units. Prof. N. Boyd is one of the heads of the new company. It is also said that S. S. Deemer, a director of the Deemer company noted, is interested in the new organization.

Georgia

DECATUR—The Common Council will soon commence work on a new filtration plant at the municipal waterworks.

ATLANTA—The Crown Mountain Mining & Mfg. Co., P. O. Box 1751, recently formed to operate at Dahlonega, Ga., has inquiries out for equipment for precious metal production and kindred manufacture, including smelting apparatus, chemicals for ore treatment, electric power and mechanical equipment.

MACON—A chemical laboratory will be installed in the new high school for boys, 3-story, 160x260 ft., to be erected by the Board of Education, estimated to cost $300,000, with equipment. Curran R. Ellis, Macon; and G. Lloyd Preacher, Augusta, Ga., are associated architects.

Kentucky

LEXINGTON—The Bybee Pottery Co. has work in progress on a new local plant for the manufacture of art pottery, and purposes to install equipment and commence production at an early date. It is also planned to provide a department for the manufacture of stoneware specialties.

LOUISVILLE—The Louisville Gas & Electric Co. has preliminary plans for extensions in its gas-manufacturing plant, to include the installation of additional equipment, estimated to cost in excess of $300,000. Bids will be called in the fall.

Louisiana

BASTROP—The Southern Glass Co. has acquired the local plant of the Ouachita Valley Glass Co. and will take immediate possession. Tentative plans are under consideration for extensions and improvements to develop maximum production in the line of bottles, jars, etc. It is purposed to commence operations at an early date.

SWARTZ—The H. C. Walton Co, Monroe, La., has acquired local property, consisting of about 15 acres of land, and plans for the construction of a new gasoline-extraction plant. It is also proposed to establish a works for the production of carbon black at a later date.

Massachusetts

BOSTON — The Boston Consolidated Gas Co., 149 Tremont St., will commence the construction of a new governor house at its artificial gas plant on Chelsea St. Plans have been filed.

Michigan

DETROIT—The Acme White Lead & Color Works has filed plans for the immediate construction of a 1-story addition to its plant at 8250 St. Aubin St., to cost about $13,000, exclusive of equipment.

Mississippi

CORINTH—C. L. Archer, Corinth, is perfecting plans for the organization of a company, with capital of $40,000, to construct and operate a local plant for the manufacture of tile products, brick and kindred specialties. A list of equipment to be installed will soon be arranged.

Missouri

ST. LOUIS—Fire, Aug. 16, destroyed a portion of the 3-story works of the Cremoline Disinfecting Co., 121-23 South Main St., manufacturer of chemicals, disinfectants, etc., with loss estimated at $25,000. It is planned to rebuild. Lon Morris is general manager.

ST. LOUIS—The Anheuser-Busch Co. has work nearing completion on a new glucose plant, occupying a portion of its former brewing works, and will commerce operations at an early date. The equipment

installation will represent an investment in excess of $750,000.

SPRINGFIELD—The Barnsdall Oil & Refining Co. has plans for the construction of a new works on Dollison St., with capacity of 25,000 gal., for mixing, storage and distributing service.

New York

BROOKLYN—The National Lead Co., 111 Broadway, New York, has awarded a general contract to the Rufus H. Brown Co., 356 Pearl St., Brooklyn, for the erection of a new 5-story and basement laboratory building at its plant on York St., estimated to cost $100,000, including equipment. Frank H. Quimby, 100 William St., is architect. To develop production in the line of paint pigments, the company has recently acquired the National Pigment & Paint Co., St. Louis, Mo., including extensive barytes ore properties, heretofore held by that company. Plans are under way for extensive production, including additional equipment installation. The property formerly held by the Mineral Refining & Chemical Co., St. Louis, has also been purchased, and will be used in connection with the expansion. The production will be used by the Titanium Pigment Co., Niagara Falls, N. Y., a subsidiary organization.

NEW YORK — The Empire Ornamental Glass Co., 437 Washington St., operating an ornamental glass and glass sign works, has acquired property at 528-30 Greenwich St., for a new plant. Extensions and improvements will be made in the existing building to cost about $18 000, and the structure equipped and occupied at an early date.

TOTTENVILLE, S. I.—The Nassau Smelting & Refining Works, Ltd., 603 West 29th St., has awarded a general contract to the Levering & Carrigues Co., 552 West 23rd St., for the erection of a group of 1-story plant buildings on local site, for metal smelting and refining, estimated to cost in excess of $100,000, with equipment. Lockwood, Greene & Co., 101 Park Ave., are architects and engineers. Benjamin Lowenstein is president.

NEW YORK—The Alexander Herz Co., 9 Barrow St., manufacturer of glassine envelopes, etc., has acquired property, 200x275 ft., on Walnut Ave., extending from 134th to 135th St., through its president, Alexander Herz, for the erection of a new plant, to cost close to $100,000, for which plans will be prepared at an early date. The company will occupy a portion of the structure which will aggregate 200,000 sq.ft. of space, the remainder to be used by affiliated organizations.

STATEN ISLAND—The Superintendent of Lighthouses, United States Government, will receive bids until Oct. 9 for one-third order, 4-panel, flashing lens, focal length 500 mm., as per specifications on file.

Ohio

CLEVELAND—The Glauber Brass Co., 7706 Platt Ave., has tentative plans under advisement for the erection of a new 1-story addition to its plant to cost close to $50,000. M. H. Glauber is head.

CLEVELAND — The Crescent Paper Tube Co., Cincinnati, has leased a local building for the establishment of a branch plant for the manufacture of paper tubing. Equipment will be installed and operations commenced at an early date.

GALION—A 1-story foundry, 50x160 ft., for the production of iron castings will be erected by the Galion Iron & Mfg. Co., estimated to cost about $50,000, including equipment. Althan Jones, Market Bldg., Mansfield, O., is engineer. D. C. Boyd is head of the company.

Oklahoma

BLACKWELL—The Hazel-Atlas Glass Co., Wheeling, W. Va., manufacturer of jars, etc., is planning for extensions and improvements in its local plant to cost about $100,000, including equipment. The work will consist of a 1-story addition, 100x180 ft., and power house extension, 65x100 ft.

Pennsylvania

PHILADELPHIA — The John Lang Paper Co., Vine and 24th Sts., has awarded a contract to Barclay White & Co., 1713 Sansom St., for the erection of an addition to its plant. The company has also awarded a contract to the same contractor for the construction of a new filter plant on the Schuylkill River.

PITTSBURGH—The American Steel Band Co., 886 Progress St., has acquired property on Nixon St., and will soon break ground for the erection of a new 1-story plant to cost about $25,000, exclusive of equipment. A consideration of about $45,000 was given for the site.

LEMOYNE—The Lemoyne Block & Brick Co., manufacturer of cement block, etc., will build two additions to its plant for increased production, each 1-story, 15x84 ft., and 19x70 ft. respectively. A list of additional machinery to be installed will soon be arranged.

Rhode Island

PROVIDENCE — The United States Gutta Percha Paint Co., Dudley St., has awarded a general contract to O. D. Purington & Co., Industrial Trust Bldg., for the erection of a 1-story addition to its plant. Perry & Whipple, Hospital Trust Bldg., are architects.

Tennessee

MEMPHIS—The Dixie Oil Co. has acquired the local plant of the American Cotton Oil Co., and will take immediate possession. The new owner purposes to make extensions and improvements in the plant, and to commence operations at an early date.

Texas

WEBSTER—Fire, Aug. 17, destroyed a portion of the local plant of the Humble Oil & Refining Co., with loss estimated at $150,000, including equipment and stock. It is planned to rebuild. Headquarters of the company are at Houston, Tex.

Virginia

MARTINSVILLE—The Mica Corp., operating mica mines in different sections of North Carolina and Virginia, has preliminary plans under consideration for the erection of a new plant on local site for the manufacture of mica products, including commercial shapes, compositions, etc. J. T. Mulhaney is president.

New Companies

PACIFIC STATES CHEMICAL CO., San Francisco, Calif.; chemicals and chemical byproducts; $50,000. Incorporators: F. J. Baringer, Joseph R. Hickey and Z. E. Jones. Representative: J. E. White, Monadnock Bldg., San Francisco.

DE-FERRIC CHEMICAL CORP., Detroit Mich.; chemicals and chemical compounds etc.; $30,000. Incorporators: William J. Harcourt, Charles A. Poxson and John J. Varn Buhler, 5160 South Martindale St., Detroit. The last noted is representative.

BOWATER PAPER CO., New York, N. Y.; paper products; $150,000. Incorporators: F. C. Bowater, R. A. Bullock and F. C. McLaughlin. Representative: McLaughlin, Russell & Sprague, 25 West 43rd St., New York.

RODGERS CHEMICAL CO., Pittsburgh, Pa.; chemicals and chemical byproducts; $10,000. Frederick G. Rodgers, 648 Boggs Ave., Pittsburgh, is treasurer.

SEIDLER CHEMICAL & SUPPLY CO., 21 Ferry St., Newark, N. J.; chemicals and kindred products; organized. Albert C. Faats heads the company.

INTERNATIONAL COTTON OIL CO., Waco, Tex.; cotton oil products; $150,000. Incorporators: J. M. Ford, H. P. Swayze and W. W. Woodson, all of Waco.

DEW-ON CORP., Wilmington Del., polishes, oils, etc.; $2,500,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington.

HERMAN CHEMICAL CO. OF ILLINOIS, INC., Chicago; chemicals and chemical byproducts; $10,000. Incorporators: Austin H. Smith, L. K. Edmondson and A. Karvatt. Registered office, 705 Chicago Stock Exchange Bldg.

CRYSTAL OIL CO., Woodburn, Ind.; refined oil products; $10,000. Incorporators: Albert D. and Elmer Stucky, and Mark Tyndall, all of Woodburn.

MACMILLAN PETROLEUM PRODUCTS CO., Long Beach, Calif.; refined oil products; $25,000. Incorporators: R. S. Macmillan, S. M. Batterson and R. A. Dooley. Representative: Joseph Crail, A. G. Bartlett Bldg., Los Angeles.

FIRST FIREPROOF PAPER CO., Wilmington, Del.; fireproofing solutions, papers, etc.; $5 000,000. Representative: Corporation Service Co., Equitable Bldg., Wilmington.

JARO CO., INC., New York, N. Y.; chemicals and chemical byproducts; nominal capital $5,000. Incorporators: P. Rudolf and N. Cion. Representative: Edward Spector, 51 Chambers St., New York.

SWINEHART RUBBER CO. OF CONNECTICUT, INC., Hartford; tires and other rubber products; $50,000. Incorporators: F. A. Stockwell, A. P. Gunn and George B. Kinsler, 240 Grandview Terrace, Hartford.

ILLINOIS ALLOY & MFG. CO., 115 South Dearborn St., Chicago, Ill.; metal alloys, etc.; $150,000. Incorporators: T. H. Reeves, V. A. Dorszeski and E. M. Williams.

EDGEWATER OIL CO., New York, N. Y.; oils and greases; $10,000. Incorporators: C. Brady, A. Leichtag and D. Spielman. Representative: S. W. Fisher, 276 5th Ave., New York.

SPECIALTY GLASS CO., Wilmington Del.; glass products; $600,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington.

BARR CHEMICAL CO., Peabody, Mass.; chemicals and chemical byproducts; $100,000. Felix Moise is president, and Paul B. Moise, Salem, Mass., treasurer. The last noted is representative.

PACIFIC PORCELAIN WARE CO., San Francisco, Calif.; porcelain products; $25 000. Incorporators: Richard S. Goldman, John A. Altman and Fred Leve. Representative: Goldman & Altman, Hobart Bldg., San Francisco.

YARNALL TANNING CO., Salem, Mass.; operate a leather tannery; $50,000. Robert B. Yarnall is president; and J. H. O'Neil, Danvers, Mass., treasurer.

INVINCIBLE PETROLEUM CORP., New York, N. Y.; oils, greases and lubricants; $100,000. Incorporators: J. M. Kornfeld, H. L. Sloan and H. Bargebuhr. Representative: Mackrustry & Kornfeld, 198 Broadway, New York.

MAGNOLIA CARBON CO., Monroe, La.; carbon black, etc.; $1 500,000. Incorporators: Travis Oliver, O. M. Grishman and R. L. Kellogg, all of Monroe. Representative: Corporation Service Co., Equitable Bldg., Wilmington, Del.

SZABADY SOAP MFG. CO., INC, Perth Amboy, N. J.; soap and soap powders, etc.; $100,000. Incorporators: Louis and Eugene Szabady, 361 New Brunswick Ave., Perth Amboy. The last noted is representative.

MANHATTAN ANTI-FREEZE CORP., New York, N. Y.; chemical compounds, etc.; nominal capital $5,000. Incorporators: J. A. and R. Doretchin, and N. Schneer. Representative: Kepp, Markewich & Perlman, 51 Chambers St., New York.

MASON-BEAUCHAMP OIL CO., Tulsa, Okla.; petroleum products; $30,000. Incorporators: Fred T. Mason and John L. Beauchamp, both of Tulsa; and G. E. Surrett, Manford, Okla.

INDIANA PAINT & PIGMENT CO, Wilmington, Del.; paints, paint pigments, etc.; $1,000,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington.

ATLANTIC FERTILIZER & CHEMICAL CO., Jacksonville, Fla.; fertilizers, chemical products, etc.; $100,000. A. L. Kreiss is president, and Solmon Brash, secretary and treasurer, both of Jacksonville.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

BORIC ACID. Czestochowa, Poland. Purchase and agency—7538.

CHEMICALS. Warsaw, Poland. Purchase and agency—7526.

CHEMICAL PRODUCTS. Stuttgart, Germany. Agency—7530.

NITRATE OF COPPER. Calcium nitrate, calcium cyanide, bicarbonate of soda and nitrate of soda. Algiers, Algeria. Purchase and agency—7557.

PAINTS for use in Tropics. Tegucigalpa, Honduras. Agency—7563.

PAINTS AND VARNISHES. Santo Domingo, Dominican Republic. Exclusive agency—7532.

ROSINS AND FATS for soap making. Posen, Poland. Purchase—7572.

COCONUT OIL. Posen, Poland. Purchase—7572.

OILS, EDIBLE. Puerto Plata, Dominican Republic. Agency—7537.

EXTRACT for tanning and coloring. Stuttgart, Germany. Agency—7530.

SOAP. Panama, Republic of Panama. Agency—7569.

ENAMEL WARE. El Fuerto, Mexico. Purchase—7555.